Supplement

Start-up and Programming

MultiControl AI/BI, RollerDrive EC5000 BI

Manufacturer details

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Content

We strive for the accuracy, timeliness and completeness of the information and have carefully prepared the contents in this document. Regardless of this, errors and changes are expressly reserved.

Online version - only suitable for color printing!

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1 About this document

1.1 Information about this operating manual

The supplement describes the different configuration options as well as the interfaces and signals of the Interroll MultiControl AI (analogue interface) and BI (bus interface) and the connected Interroll RollerDrives EC5000 BI.

The latest version of this supplement can be found online at:

www.interroll.com/products-solutions/downloads/

All the information and advice in this document has been compiled with respect to applicable standards and regulations as well as the current state of the art.

➢ To ensure safe and faultless operation and to fulfil any warranty claims that may apply, first read the operating manuals for the MultiControl and the RollerDrive EC5000 and observe the instructions.

The manufacturer assumes no liability for damage and malfunctions that occur as a result of non-compliance with these operating manuals.

Should you still have any unanswered questions after reading the operating manuals, please contact Interroll customer service. Contact details for your region can be found online at www.interroll.com/contact/

Please direct any comments and suggestions regarding our operating manuals to manuals@interroll.com

1.2 Symbols

This symbol indicates useful and important information.

✓ This symbol indicates the result of a performed action.

This symbol indicates general information relating to safety.

➢ This symbol indicates an action that needs to be performed.

• This symbol indicates a listed item.

1.3 Data types

The following data types are used for cyclical and acyclical communication with the MultiControl:

Abbreviation	Data type	Description
BOOL	Boolean	Truth value (true/false)
BYTE	Byte	Bit sequence with 8 bits
INT8	8-bit integer	Integer variable with 8 bits
INT16	16-bit integer	Integer variable with 16 bits
INT32	32-bit integer	Integer variable with 32 bits
UINT8	8-bit unsigned integer	Positive integer variable with 8 bits
UINT16	16-bit unsigned integer	Positive integer variable with 16 bits
UINT32	32-bit unsigned integer	Positive integer variable with 32 bits
STRING	String	Character chain with max. 31 characters

2 Description

The new DC platform comprising the

- Interroll High Performance power supply units DC5424 and DC5448
- Interroll MultiControl AI/BI
- Interroll RollerDrive EC5000 AI/BI

marks Interroll's first step towards Industry 4.0.

In addition to tried-and-tested options for component start-up and programming, Interroll now offers a CANopen connection between the MultiControl BI and the connected RollerDrives EC5000 BI for the first time.

Among other benefits, this opens up new possibilities for monitoring the connected drives and therefore detecting possible wear early on, resulting in a predictable replacement of the affected RollerDrives.

3 Configuration options

The MultiControl must be configured before it can be started up. There are various ways of doing this:

- All settings can be configured via a web-based user interface on a computer connected to the MultiControl (see "Interroll MultiControl operating manual").
- Using the magnetic sensor, the sensors, bus type and LED displays can configured directly on the MultiControl and the MultiControl can be tested, configured automatically or reset to factory settings (see „Magnetic sensor“ on page 13).
- All settings except the bus type can be configured via service data objects (SDOs) written by a higher-level control system (see „MultiControl service data objects (SDO)“ on page 17).
- The station name, the IP configuration and the connection settings can be modified via a PLC development environment.
- The data is automatically transferred by the Plug&Play function when the MultiControl is replaced.

4 Magnetic sensor

An optional magnet (see Interroll MultiControl operating manual/Appendix/Accessories) is used to actuate the fitted magnetic sensor.

The magnetic sensor is located on the top of the MultiControl, between the two Rs of "INTERROLL" directly in front of the base plate (see Interroll MultiControl operating manual/Product information/Setup).

The magnetic sensor can be used to perform the following functions:

- Setting the sensors
- Setting the bus type
- Executing the teach-in process
- Switching LED displays on or off
- Resetting the MultiControl to the default settings

Selecting functions

➢ Hold the magnet up to the magnetic sensor.

✓ The "Fault" LED will light up permanently once the magnetic sensor detects the magnet. After one second, chase lighting starts on the LED strip on the left side of the MultiControl.

Each LED corresponds to a specific function:

No.	LED	Function
1	Sensor 1	Cancellation
2	I/O 1	Setting the sensors
3	RD 1	Setting the bus type
4	RD 2	Teach-in process
5	Sensor 2	Switching the LED displays for the sensors / I/Os on or off
6	I/O 2	Resetting the MultiControl to the default settings
7	Sensor 1 + I/O 1	Switch Plug&Play mode on / off

Magnetic sensor

➢ To select a function, remove the magnet when the corresponding LED lights up.

✓ The selection is confirmed two seconds after the magnet is removed. During this period, the "Ready" and "Net Run" LEDs as well as the LED for the selected function flash. If a second selection is associated with this function, the LED for the current selection flashes for approx. seven seconds.

➢ To select the second choice, hold the magnet up to the magnetic sensor again after two seconds.

✓ Chase lighting starts on the LED strip on the right side of the MultiControl.

Function	Selection	Selection no.	LED
2: Setting the sensors	PNP normally closed	1	Sensor 3
	NPN normally closed	2	I/O 3
	PNP normally open	3	RD 3
	NPN normally open	4	RD 4
3: Setting the bus type	EtherCAT	1	Sensor 3
	PROFINET	2	I/O 3
	EtherNet/IP	3	RD 3
	EtherCAT/CANopen	4	RD 4
	EtherCAT/CANopen Pro	5	Sensor 4
	EtherCAT BI	6	I/O 4
4: Teach-in process	Initialise motors	1	I/O 3
	Start teach-in	2	RD 4
	Cancel teach-in	3	Sensor 3
6: Resetting the MultiControl to the default settings	Confirmation		I/O 4

➢ To confirm the second selection, remove the magnet when the corresponding LED lights up. The selection is confirmed five seconds after the magnet is removed.

If the EtherCAT bus type is selected, the user interface can no longer be used after restarting as it is not supported by this bus type.

LED displays when using the magnetic sensor

The "Fault" LED will light up permanently once the magnetic sensor detects the magnet. If the setting is activated via the magnetic sensor, the "Ready" and "Net Run" LEDs also flash with a frequency of 1 Hz.

LED	Status	Meaning
Sensor 1	On	Setting function 1: Cancellation
I/O 1	On	Setting function 2: Setting the sensors
I/O 1 + sensor 3	On	Selection 1 for setting function 2: PNP normally closed sensors
I/O 1 + I/O 3	On	Selection 2 for setting function 2: NPN normally closed sensors
I/O 1 + RD 3	On	Selection 3 for setting function 2: PNP normally open sensors
I/O 1 + RD 4	On	Selection 4 for setting function 2: NPN normally open sensors
RD 1	On	Setting function 3: Setting the bus type
RD 1 + sensor 3	On	Selection 1 for setting function 3: EtherCAT
RD 1 + I/O 3	On	Selection 2 for setting function 3: PROFINET
RD 1 + RD 3	On	Selection 3 for setting function 3: EtherNet/IP
RD 1 + RD 4	On	Selection 4 for setting function 3: EtherCAT/CANopen
RD1 + Sensor 4	On	Selection 5 for setting function 3: EtherCAT/CANopen Pro
RD1 + I/O 4	On	Selection 6 for setting function 3: EtherCAT BI
RD 2	On	Setting function 4: Teach-in process
RD 2 + sensor 3	On	Selection 1 for setting function 4: Initialise motors
RD 2 + I/O 3	On	Selection 2 for setting function 4: Start teach-in
RD 2 + RD 3	On	Selection 3 for setting function 4: Cancel teach-in
Sensor 2	On	Setting function 5: Switching the LED displays for the sensors / I/Os on or off
I/O 2	On	Setting function 6: Resetting the MultiControl to the default settings
I/O 2 + I/O 4	On	Confirmation of setting function 6: Resetting the MultiControl to the default settings
Sensor 3	Flashes at 1 Hz	EtherCAT stack loading
I/O 3	Flashes at 1 Hz	PROFINET stack loading
RD 3	Flashes at 1 Hz	Ethernet/IP stack loading

Magnetic sensor

The "Ready" and "Net Run" LEDs flash with a frequency of 2 Hz together with the following displays. The "Fault" LED is off.

LED	Status	Meaning
RD 1 Sensor 3	On Flashes at 2 Hz	"EtherCAT" selection active, magnetic sensor not/no longer actuated
RD 1 I/O 3	On Flashes at 2 Hz	"PROFINET" selection active, magnetic sensor not/no longer actuated
RD 1 RD 3	On Flashes at 2 Hz	"Ethernet/IP" selection active, magnetic sensor not/no longer actuated
RD 1 RD 4	On Flashes at 2 Hz	“EtherCAT/CANopen” selection active, magnetic sensor not/no longer actuated
RD 1 Sensor 4	On Flashes at 2 Hz	“EtherCAT/CANopen Pro” selection active, magnetic sensor not/no longer actuated
RD 1 I/O 4	On Flashes at 2 Hz	“EtherCAT BI” selection active, magnetic sensor not/no longer actuated
I/O 2 I/O 4	On Flashes at 2 Hz	Confirmation for setting function 6: Reset selected, magnetic sensor not/no longer actuated

5 MultiControl service data objects (SDO)

Virtually all MultiControl settings (except the bus type) can be modified by means of acyclical communication. This communication corresponds to the service data objects (SDO) of the CANopen protocol. They can be accessed via the relevant functions according to IEC 61131-3.

The SDOs are arranged in indices and subindices. When configuration takes place via EtherCAT systems, the index and subindex are separated by a colon (e.g. index 0x4700, subindex A becomes 0x4700:0A). For access via PROFINET and Ethernet/IP, the index and subindex have to be added up (e.g. 0x4700, subindex A becomes 0x470A).

CAN gateway

SDO index: 0x200

Subindex	Designation	Data type	Access	Comments
1	CAN gateway	VAR	R/W	

Version information

SDO index: 0x4000

Subindex	Designation	Data type	Access	Comments
1	Hardware	STRING	R	
2	Application software	STRING	R	
3	System software	STRING	R	
4	Network software	STRING	R	

Manufacturer information

SDO index: 0x4100

Subindex	Designation	Data type	Access	Comments
1	Serial number	STRING	R	
2	Production Date	STRING	R	

Diagnosis information

SDO index: 0x4200

Subindex	Designation	Data type	Access	Comments
1	Act. motor voltage [mV]	UINT16	R	Effective motor supply voltage
2	Max. motor voltage [mV]	UINT16	R	Maximum motor supply voltage
3	Min. motor voltage [mV]	UINT16	R	Minimum motor supply voltage
4	Act. logic voltage [mV]	UINT16	R	Effective logic supply voltage
5	Max. logic voltage [mV]	UINT16	R	Maximum logic supply voltage
6	Min. logic voltage [mV]	UINT16	R	Minimum logic supply voltage
7	Act. temperature [°C]	INT16	R	Effective temperature
8	Max. temperature [°C]	INT16	R	Maximum temperature
9	Min. temperature [°C]	INT16	R	Minimum temperature

Error information

SDO index: 0x4300

Subindex	Designation	Data type	Access	Comments
1	Error State	UINT8	R	1 = in operation 2 = minor error 3 = severe error
2	Error code	UINT16	R	Error number of actual error (0 = no error)
3	Time motor error 1	UINT32	R	Time since last error from motor 1
4	Time motor error 2	UINT32	R	Time since last error from motor 2
5	Time motor error 3	UINT32	R	Time since last error from motor 3
6	Time motor error 4	UINT32	R	Time since last error from motor 4

Network online time

SDO index 0x4400

Subindex	Designation	Data type	Access	Comments
0	Network online time	UINT32	R	Bus operating time

Control program information

SDO index: 0x4500

Subindex	Designation	Data type	Access	Comments
1	Selected state table	UINT16	R	Selected state table
2	Version year	UINT16	R	Application program version
3	Version month	UINT8	R	
4	Version day	UINT8	R	
5	Version hour	UINT8	R	
6	IO 1 usage	UINT8	R	IO 1 is used in the selected state table
7	IO 2 usage	UINT8	R	IO 2 is used in the selected state table
8	IO 3 usage	UINT8	R	IO 3 is used in the selected state table
9	IO 4 usage	UINT8	R	IO 4 is used in the selected state table

Bus parameters

SDO index: 0x4600

Subindex	Designation	Data type	Access	Comments
1	Bus type	UINT8	R	Bus type used: 1 = EtherCAT 2 = PROFINET 3 = Ethernet/IP 4 = EtherCAT CANopen 5 = EtherCAT CANopen Pro 6 = EtherCAT BI
2	IP configuration mode	UINT8	R/W	Configuration mode of the address: 0 = static 1 = BOOTP 2 = DHCP
3	IP address	UINT32	R/W	Own IP address
4	IP network mask	UINT32	R/W	Subnet mask
5	Gateway IP address	UINT32	R/W	Default gateway IP address
6	IP address DNS 1	UINT32	R/W	IP address domain name server #1
7	IP address DNS 2	UINT32	R/W	IP address domain name server #2
8	IP host name	STRING	R/W	IP host name
9	IP domain name	STRING	R/W	IP domain name
A	Enable ACD	BOOL	R/W	Detection of address conflicts (Ethernet/IP)
B	Enable quick start-up	BOOL	R/W	Network quick start enable (PROFINET)

If the EtherCAT bus type is selected, the user interface can no longer be used after restarting as it is not supported by this bus type.

Subindex	Designation	Data type	Access	Comments
C	IP address neighbour 1	UINT32	R/W	IP address of upstream module
D	IP address neighbour 2	UINT32	R/W	IP address of downstream module
E	IP address neighbour 3	UINT32	R/W	IP address of lateral module 1
F	IP address neighbour 4	UINT32	R/W	IP address of lateral module 2
10	IP address neighbour 5	UINT32	R/W	IP address of Transfer zone 1
11	IP address neighbour 6	UINT32	R/W	IP address of Transfer zone 2
12	IP address neighbour 7	UINT32	R/W	IP address of Transfer zone 3
13	IP address neighbour 8	UINT32	R/W	IP address of Transfer zone 4
14	Big-endian format	BOOL	R/W	PLC data is in big-endian format (MSB first)
15	Process image variant input	UINT8	R	1 = universal full 2 = universal compact 3 = control mode 4 = I/O mode 5 = I/O mode tiny 6 = CANopen 7 = CANopen Pro 8 = Universal Full BI
16	Process image variant output	UINT8	R	
17	PaP Enable	BOOL	R/W	True = Plug&Play enabled False = Plug&Play disabled
18	Restart system	UINT8	R/W	127 = Restart

In big-endian format, the higher-level byte is saved first for composite data.

Motor settings

CAUTION

Risk of malfunction!

➢ Change the motor configuration via SDO only when motors are stopped!

SDO index: 0x4700

Subindex	Designation	Data type	Access	Comments	Min.	Max.
1	Motor type 1	UINT8	R/W	Motor type at connection RD1: 0 = none 1 = EC310 2 = VDC_SPEED 3 = VDC_POSITION 4 = EC5000	0	4
2	Motor type 2	UINT8	R/W	Motor type at connection RD2	0	4
3	Motor type 3	UINT8	R/W	Motor type at connection RD3	0	4
4	Motor type 4	UINT8	R/W	Motor type at connection RD4	0	4
5	Direction CW 1	BOOL	R/W	True = RollerDrive rotating clockwise False = RollerDrive rotating counterclockwise		
6	Direction CW 2	BOOL	R/W			
7	Direction CW 3	BOOL	R/W			
8	Direction CW 4	BOOL	R/W			
9	Diameter 1 [mm] *	UINT16	R/W	RollerDrive roller diameter	30	100
A	Diameter 2 [mm] *	UINT16	R/W			
B	Diameter 3 [mm] *	UINT16	R/W			
C	Diameter 4 [mm] *	UINT16	R/W			
D	Gear ratio 1 *	UINT16	R/W	RollerDrive gear ratio [XX:1] Only enter "XX"!	1	100
E	Gear ratio 2 *	UINT16	R/W			
F	Gear ratio 3 *	UINT16	R/W			
10	Gear ratio 4 *	UINT16	R/W			
11	Normal speed 1 [mm/s]	UINT16	R/W	Normal conveyor speed	100	2000
12	Normal speed 2 [mm/s]	UINT16	R/W			
13	Normal speed 3 [mm/s]	UINT16	R/W			
14	Normal speed 4 [mm/s]	UINT16	R/W			

* With RollerDrive BI preset and not editable

Subindex	Designation	Data type	Access	Comments	Min.	Max.
15	Alternate speed 1 [mm/s]	UINT16	R/W	Alternate RollerDrive speed	100	2000
16	Alternate speed 2 [mm/s]	UINT16	R/W			
17	Alternate speed 3 [mm/s]	UINT16	R/W			
18	Alternate speed 4 [mm/s]	UINT16	R/W			
19	Acceleration 1 [mm/s^2]	UINT16	R/W	RollerDrive acceleration	0	19999
1A	Acceleration 2 [mm/s^2]	UINT16	R/W			
1B	Acceleration 3 [mm/s^2]	UINT16	R/W			
1C	Acceleration 4 [mm/s^2]	UINT16	R/W			
1D	Deceleration 1 [mm/s^2]	UINT16	R/W	RollerDrive deceleration	0	19999
1E	Deceleration 2 [mm/s^2]	UINT16	R/W			
1F	Deceleration 3 [mm/s^2]	UINT16	R/W			
20	Deceleration 4 [mm/s^2]	UINT16	R/W			
21	Throughput 1 [Parts/h]	UINT16	R	Calculated throughput Sensor 1	0	65535
22	Throughput 2 [Parts/h]	UINT16	R	Calculated throughput Sensor 2	0	65535
23	Throughput 3 [Parts/h]	UINT16	R	Calculated throughput Sensor 3	0	65535
24	Throughput 4 [Parts/h]	UINT16	R	Calculated throughput Sensor 4	0	65535
25	Delay Start [ms]	UINT16	R/W	Starting current limitation (Default 100 ms)	0	1000
26	Delay Stop [ms]	UINT16	R/W	Run-out current limitation) Default 100 ms)	0	1000
27	Use Old Brake Voltage	BOOL	R/W	Switching the chopper operational voltage (Default = 0) 0 = 28 V 1 = 26 V		

Inputs and outputs

SDO index: 0x4800

Subindex	Designation	Data type	Access	Comments
1	Type PNP sensor 1	BOOL	R/W	True = PNP sensor False = NPN sensor
2	Type PNP sensor 2	BOOL	R/W	
3	Type PNP sensor 3	BOOL	R/W	
4	Type PNP sensor 4	BOOL	R/W	
5	Type PNP AUX 1	BOOL	R/W	True = PNP sensor False = NPN sensor Attention: This will also affect the use of AUX as an output.
6	Type PNP AUX 2	BOOL	R/W	
7	Type PNP AUX 3	BOOL	R/W	
8	Type PNP AUX 4	BOOL	R/W	
9	Pos. polarity sensor 1	BOOL	R/W	True = positive polarity sensor (physical "1" corresponds to logical "1") False = negative polarity sensor (physical "0" corresponds to logical "1")
A	Pos. polarity sensor 2	BOOL	R/W	
B	Pos. polarity sensor 3	BOOL	R/W	
C	Pos. polarity sensor 4	BOOL	R/W	
D	Pos. polarity AUX 1	BOOL	R/W	
E	Pos. polarity AUX 2	BOOL	R/W	
F	Pos. polarity AUX 3	BOOL	R/W	
10	Pos. polarity AUX 4	BOOL	R/W	
11	IO function AUX 1	UINT8	R/W	Function selection for AUX I/O (see „9 I/O Konfiguration" on page 82)
12	IO function AUX 2	UINT8	R/W	
13	IO function AUX 3	UINT8	R/W	
14	IO function AUX 4	UINT8	R/W	
15	IO diagnosis LED on	BOOL	R/W	TRUE = LED on FALSE = LED off

Subindex	Designation	Data type	Access	Comments	Min.	Max.
16	Shutdown AUX Output	BOOL	R/W	False = When the Power RollerDrive is switched off, the output goes into sleep mode. True = When Power RollerDrive is switched off, the output retains the state specified by the PLC. SW-Version V2.1.xx to V2.3.7: The output cannot be switched as long as Power RollerDrive is not switched on. SW-Version from V2.3.10: The output can be switched independently of Power RollerDrive.		
17	Sensor 1 ON delay	UINT16	R/W	Delay in ms	0	65535
18	Sensor 2 ON delay	UINT16	R/W			
19	Sensor 3 ON delay	UINT16	R/W			
1A	Sensor 4 ON delay	UINT16	R/W			
1B	Sensor 5 ON delay	UINT16	R/W			
1C	Sensor 6 ON delay	UINT16	R/W			
1D	Sensor 7 ON delay	UINT16	R/W			
1E	Sensor 8 ON delay	UINT16	R/W			
1F	Sensor 1 OFF delay	UINT16	R/W			
20	Sensor 2 OFF delay	UINT16	R/W			
21	Sensor 3 OFF delay	UINT16	R/W			
22	Sensor 4 OFF delay	UINT16	R/W			
23	Sensor 5 OFF delay	UINT16	R/W			
24	Sensor 6 OFF delay	UINT16	R/W			
25	Sensor 7 OFF delay	UINT16	R/W			
26	Sensor 8 OFF delay	UINT16	R/W			

Application module

SDO index: 0x4900

Subindex	Designation	Data type	Access	Comments
1	State table ID	UINT16	R/W	I/O device = 0xFFFF ZPA single release 1 zone = 0x00 ZPA single release 2 zone = 0x01 ZPA single release 3 zone = 0x02 ZPA single release 4 zone = 0x03 ZPA train release 1 zone = 0x04 ZPA train release 2 zone = 0x05 ZPA train release 3 zone = 0x06 ZPA train release 4 zone = 0x07 ZPA Transfer in = 0x08 ZPA Transfer out = 0x09 ZPA merge = 0x0A ZPA HPD = 0x0B HPD semi-automatic = 0x0C Transfer semi-automatic = 0x0D
2	Timer 1 [ms]	UINT16	R/W	I/O device application program: No relevance Other application programs: Setting in line with description
3	Timer 2 [ms]	UINT16	R/W	
4	Timer 3 [ms]	UINT16	R/W	
5	Timer 4 [ms]	UINT16	R/W	

Error behaviour

SDO index: 0x4A00

Subindex	Designation	Data type	Access	Comments
1	Bus error handling	UINT8	R/W	1 = ignore – error is ignored 2 = warning – error is displayed by LED and logged 3 = minor error – motor is stopped immediately (I/O device) or motor is stopped within a logic program (other application program). 4 = severe error – motor is stopped immediately.
2	Overvoltage error handling	UINT8	R/W	
3	Undervoltage error handling	UINT8	R/W	
4	RollerDrive error handling	UINT8	R/W	
5	State table error handling	UINT8	R/W	
6	Sensor error handling	UINT8	R/W	

6 Description of service functions

6.1 Teach-in

The teach-in process offers the option of automatically addressing several MultiControls. In addition, the configuration of one MultiControl can be transferred to other MultiControls.

The process can be triggered by using the magnetic key or by a function in the web server.

Teach-in is not available with network configuration „EtherCAT"!

Once the teach-in process in complete, all modules will be in ZPA mode.

If a setting is changed in the first MultiControl prior to the process, the MultiControls will be in the selected control program following teach-in.

Example:

Changed values in MultiControl 1

- Normal speed: 0.8 m/s
- IP address: 192.168.0.20
- Control program: I/O device

After the teach-in process, the system is in I/O device mode, all RollerDrives are set to the speed value 0.8 m/s, each IP address has been counted up by one (192.168.0.21, 192.168.0.22, etc.).

The teach-in process always starts at the first MultiControl on the conveyor. All MultiControls are contacted when transferring settings from one MultiControl to another. For this reason, the teach-in process is independent of the physical bus cable layout (topology).

The following settings are determined or stipulated:

- The network settings (host name, IP address, bus protocol, neighbouring addresses, etc.)
- The application settings (motor settings, control program, sensor settings, digital I/O, etc.)
- The error settings

Prerequisites

- All MultiControls are either in the as-delivered condition or have been (re)set to factory settings.
- The sensor types are configured correctly (PNP/NPN types and normally open/closed switching logic).
- All sensors must be of the same type.
- There is no material to be conveyed on the conveyor.

The process has several steps:

Step 1: Initialising the motor configuration

Step 2: Assigning the "slave RollerDrives"

Basic MultiControl settings

All network, application and error settings of the first MultiControl can be changed prior to the teach-in process. The names (host names) and IP addresses of the other connected MultiControls are each increased by one during the teach-in process. The settings of the first MultiControl are transferred to each subsequent one.

Initialising the motors

1. Via the web browser in the Service/Teach-in/Init menu
2. Using the magnetic key:

➢ Activate the magnetic sensor to start the teach-in process. The "Fault" LED will light up permanently once the magnetic sensor detects the magnet.

✓ After one second, chase lighting starts on the LED strip on the left side of the MultiControl.

➢ Once the "RD 2" LED lights up, remove the magnetic key and wait until chase lighting starts on the right LED strip.

➢ Activate the magnetic sensor again.

➢ Remove the magnet once the "I/O 3" LED lights up.

The RollerDrives connected to the first MultiControl rotate, all other RollerDrives in the conveyor system start rotating with a slight delay.

If a RollerDrive rotates unevenly, a different RollerDrive connected to the same MultiControl is faulty or connected incorrectly.

Assigning slave RollerDrives

1. Via the web browser in the Service/Teach-in/Start menu
2. Using the magnetic key:

➢ Select the "RD 2" LED on the left side with the magnetic key again, remove the magnetic key and wait until chase lighting starts on the right LED strip.

➢ Activate the magnetic sensor again. Remove the magnetic key once the "RD 4" LED lights up.

If RollerDrives are connected to a MultiControl without corresponding zone sensors, these are identified as slave RollerDrives. The slave RollerDrives of one zone rotate in pulses. The slave RollerDrives are assigned by activating the relevant zone sensor.

Program	Assigned motors and sensors
Quadruple storage	B1 (for M1), B2 (for M2), B3 (for M3), B4 (for M4)
Triple storage	B1 (for M1), B2 (for M2), B3 (for M3)
Double storage	B1 (for M1 + M3), B2 (for M2 + M4)
Single storage	B1 (for M1 + M2 + M3 + M4)

Once all slave RollerDrives are assigned, the RollerDrive of the first zone starts rotating alternatingly.

Once the RollerDrive rotates in the required conveying direction, place material to be conveyed into the zone sensor for the first zone. The teach-in process now occurs automatically. If the one RollerDrive's direction of rotation does not correspond to the conveying direction, it is changed (material to be conveyed moves in place). Due to the required data transfer, there are breaks when moving from one MultiControl to the next.

Once the material to be conveyed has reached the last zone sensor, the material to be conveyed can be removed as it may otherwise be conveyed out of the last zone and fall.

The teach-in process is completed automatically and the conveyor is initialised again. The system is ready for operation following restart.

Cancelling the teach-in process

1. Via the web browser user interface in the Service/Teach-in/Abort menu
2. Using the magnetic key:

➢ Activate the magnetic sensor to cancel the teach-in process. The "Fault" LED will light up permanently once the magnetic sensor detects the magnetic key.

➢ After one second, chase lighting starts on the LED strip on the left side of the MultiControl.

➢ Once the "RD 2" LED lights up, remove the magnetic key and wait until chase lighting starts on the right LED strip.

➢ Activate the magnetic sensor again.

➢ Remove the magnetic key once the "Sensor 3" LED lights up.

Configuring the sensors

If the sensor settings are changed and the ZPA program is required, this must be set via the web browser.

If sensors do not match the MultiControl's factory settings, they can be changed using the magnet:

➢ Activate the magnetic sensor. The "Fault" LED will light up permanently once the magnetic sensor detects the magnet.

➢ After one second, chase lighting starts on the LED strip on the left side of the MultiControl.

➢ Once the "I/O 1" LED lights up, please remove the magnet and wait until chase lighting starts on the right LED strip. Activate the magnetic sensor again.

➢ Remove the magnet once the LED for the required sensor type lights up.

Sensor type	MultiControl LED
PNP normally closed	Sensor 3
NPN normally closed	I/O 3
PNP normally open	RD 3
NPN normally open	RD 4

6.2 Plug&Play

MultiControls can be easily replace via Plug&Play technology.

Plug&Play is not available with network configuration „EtherCAT"!

This method means that a MultiControl is configured without external access. The replaced MultiControl receives the same settings as the removed module.

If several MultiControls need to be replaced at the same time, the semi-automatic Plug&Play method needs to be selected.

If a MultiControl is set to factory settings, the Plug&Play technology is always activated.

Activation/deactivation:

1. Via the web browser user interface in the Service/Plug&Play menu
2. Using the magnetic key:

➢ Activate the magnetic sensor to start the Plug&Play function. The "Fault" LED will light up permanently once the magnetic sensor detects the magnet.

➢ After one second, chase lighting starts on the LED strip on the left side of the MultiControl.

➢ Once the "Sensor 1" LED lights up, remove the magnetic key and wait until chase lighting starts on the right LED strip.

➢ Activate the magnetic sensor again.

➢ Remove the magnetic key once the "I/O 1" LED lights up.

"Sensor 3" LED flashes – deactivated

"I/O 3" LED flashes – activated

To change the setting, hold the magnetic key in position until the required option is selected.

This option can be changed on each MultiControl and triggers a signal to all MultiControls in the same subnetwork so that all Plug&Play settings are changed accordingly.

Once a new MultiControl has been restarted twice, the same configuration as before the replacement is set and the unit is ready for operation.

6.3 Semi-automatic Plug&Play

1. Switch the device to be configured to semi-automatic mode:
   - ➢ Select function 7 ("Sensor 1" + "I/O 1" LED)
   - ➢ Select function 3 ("RD 3" LED)

   The MultiControl is ready for configuration once the "RD 1" LED lights up.

   This mode does not have a time limit. It can only be cancelled by restarting the MultiControl.

Only prepare one MultiControl for configuration at a time! Otherwise all prepared units will receive the same configuration.

Plug&Play is not available with network configuration „EtherCAT"!

2. Switch the upstream or downstream device to semi-automatic mode in the same way (if one MultiControl measures several neighbouring devices, take into account that the upstream device has the highest priority and Transfer 4 has the lowest priority).
   - ➢ Select function 7 ("Sensor 1" + "I/O 1" LED)
   - ➢ Select function 3 ("RD 3" LED)

   This MultiControl sends the configuration to the unit awaiting configuration. The data transfer can be repeated several times, if the transmission/receipt failed the first time. The new device is configured and ready for operation after two restarts.

   The teach-in process for a new MultiControl can only be performed via the upstream or downstream MultiControl. It is not possible to teach-in a Transfer partner.

Restore the settings on all other unconfigured MultiControls in the same way.

Plug&Play does not work if the IP address does not come from the static address allocation.

If an error occurs during Plug&Play, the "I/O 3" LED lights up and the "Sensor 1", "I/O 1", "I/O 2" and "Sensor 2" LEDs start flashing.

Select functions 7 ("Sensor 1" and "I/O 1" LED) and 4 ("RD 4" LED) with the magnetic key to acknowledge the error.

Then carry out a factory reset using function 6 ("I/O 2" LED and function 6 LED "I/O 4").

7 Process data

The process data is split into two parts, the input process image and the output process image.

The addresses listed in this chapter should be regarded as an offset to the start addresses specified in the PLC configuration.

7.1 Input process image

The input process image is divided into four parts:

- Sensors
- Digital I/O
- Motor status
- Other

Sensors

The information about the sensor switching states can be found in the first byte of the process image. The first four bits contain the physical states of the "Sensor 1" to "Sensor 4" inputs, depending on the set PNP/NPN configuration and the positive or negative polarity.

The "Sensor 5" to "Sensor 8" inputs are only shown here if I/O 1 to 4 are configured as additional sensors.

Designation	Byte	Bit	Data type	Comments
Sensor 1	0	0	BOOL	"Sensor 1" input
Sensor 2	0	1	BOOL	"Sensor 2" input
Sensor 3	0	2	BOOL	"Sensor 3" input
Sensor 4	0	3	BOOL	"Sensor 4" input
Sensor 5	0	4	BOOL	"Sensor 5" input
Sensor 6	0	5	BOOL	"Sensor 6" input
Sensor 7	0	6	BOOL	"Sensor 7" input
Sensor 8	0	7	BOOL	"Sensor 8" input

Digital I/O

The second byte contains the states of the digital I/Os. The value of the variable depends on the PNP/NPN configuration and the positive or negative polarity. When using the I/Os as outputs, the specified switching status is also displayed.

Designation	Byte	Bit	Data type	Comments
I/O 1	1	0	BOOL	"I/O 1" input
I/O 2	1	1	BOOL	"I/O 2" input
I/O 3	1	2	BOOL	"I/O 3" input
I/O 4	1	3	BOOL	"I/O 4" input
Spare	1	4	BOOL	These four bits are not currently used.
	1	5	BOOL	
	1	6	BOOL	
	1	7	BOOL	

Motor status

Starting at the third byte, the status values for the connected motors are provided.

The error outputs of the connected motors are represented first. A logical "1" at the input means "The motor is faulty" here. To ensure that unused motor connections do not cause any errors, the connections should be deactivated even when using the MultiControl as an I/O device.

The set target values of the motors are output second.

The current consumption of the motors is specified third.

Designation	Byte	Bit	Data type	Comments
Motor error 1	2	0	BOOL	"RD 1" motor error
Motor error 2	2	1	BOOL	"RD 2" motor error
Motor error 3	2	2	BOOL	"RD 3" motor error
Motor error 4	2	3	BOOL	"RD 4" motor error
Spare	2	4	BOOL	These four bits are not currently used.
	2	5	BOOL	
	2	6	BOOL	
	2	7	BOOL	
Speed 1	3		INT8	[%] Motor 1 target value
Speed 2	4		INT8	[%] Motor 2 target value
Speed 3	5		INT8	[%] Motor 3 target value
Speed 4	6		INT8	[%] Motor 4 target value
Spare	7		BYTE	This byte is not used
Motor current 1	8		UINT16	[mA] Motor 1 motor current
Motor current 2	10		UINT16	[mA] Motor 2 motor current
Motor current 3	12		UINT16	[mA] Motor 3 motor current
Motor current 4	14		UINT16	[mA] Motor 4 motor current

System status

The fourth area of the input process image represents the following system status information:

- The current level of the two supply voltages
- The temperature
- The runtime since the last restart

Designation	Byte	Bit	Data type	Comments
Voltage 1	16		INT16	[mV] "Power motor" supply voltage
Voltage 2	18		INT16	[mV] "Power logic + sensors" supply voltage
Temperature	20		INT16	[°C] MultiControl temperature
Runtime	22		UINT32	[s] Time since last restart

Other signals

The last part of the input process image is divided into five subsections:

- Control inputs
- Control outputs
- Handshake signals
- Zone status
- Global signals

These input signals are not relevant when using the MultiControl as an I/O device.

Process data

Designation	Byte	Bit	Data type	Comments
ControlInput 1	26	0	BOOL	
ControlInput 2	26	1	BOOL	
ControlInput 3	26	2	BOOL	
ControlInput 4	26	3	BOOL	
ControlInput 5	26	4	BOOL	
ControlInput 6	26	5	BOOL	
ControlInput 7	26	6	BOOL	
ControlInput 8	26	7	BOOL	
DecisionByte	27		BYTE	
ControlOutput 1	28	0	BOOL	
ControlOutput 2	28	1	BOOL	
ControlOutput 3	28	2	BOOL	
ControlOutput 4	28	3	BOOL	
ControlOutput 5	28	4	BOOL	
ControlOutput 6	28	5	BOOL	
ControlOutput 7	28	6	BOOL	
ControlOutput 8	28	7	BOOL	
In up	29	0	BOOL	
In down	29	1	BOOL	
In left	29	2	BOOL	
In right	29	3	BOOL	
Out up	29	4	BOOL	
Out down	29	5	BOOL	
Out left	29	6	BOOL	
Out right	29	7	BOOL	
ZoneBusy 1	30	0	BOOL	
ZoneBusy 2	30	1	BOOL	
ZoneBusy 3	30	2	BOOL	

Designation	Byte	Bit	Data type	Comments
ZoneBusy 4	3	3	BOOL	
Spare	30	4	BOOL	
Spare	30	5	BOOL	
Spare	30	6	BOOL	
Spare	30	7	BOOL	
ZoneError 1	31		UINT8	
ZoneError 2	32		UINT8	
ZoneError 3	33		UINT8	
ZoneError 4	34		UINT8	
Spare	35	0	BOOL	
Spare	35	1	BOOL	
Spare	35	2	BOOL	
Spare	35	3	BOOL	
Spare	35	4	BOOL	
Spare	35	5	BOOL	
Spare	35	6	BOOL	
Spare	35	7	BOOL	

7.2 Output process image

The output process image is divided into three parts:

- Digital I/O
- Motors
- Other signals

Digital outputs

The digital outputs can be found in the first part of the process image. The outputs can only be switched directly with a PLC if the I/O is set to "2: PLC output". The physical state at the output also depends on the configuration of the output (PNP/NPN, positive or negative polarity).

Designation	Byte	Bit	Data type	Comments
I/O 1	0	0	BOOL	"I/O 1" output
I/O 2	0	1	BOOL	"I/O 2" output
I/O 3	0	2	BOOL	"I/O 3" output
I/O 4	0	3	BOOL	"I/O 4" output
Spare	0	4	BOOL	These four bits are not currently used.
	0	5	BOOL	
	0	6	BOOL	
	0	7	BOOL	

Motors

The outputs for the connected motor target values can be found in the second part of the process image.

Designation	Byte	Bit	Data type	Comments
Speed 1	1		INT8	[%] Motor 1 speed target value
Speed 2	2		INT8	[%] Motor 2 speed target value
Speed 3	3		INT8	[%] Motor 3 speed target value
Speed 4	4		INT8	[%] Motor 4 speed target value

The speed of the connected RollerDrives depends on the gear ratio.

- ➢ To set the speed, activate the "Speed" output on the MultiControl's "RD" connection with percentages between 5 and 100 in line with the following table. (Values that are not listed can be determined by linear interpolation)
- ➢ To reverse the direction of rotation, use negative values between -5 and -100.

EC310

"Speed" output on "RD" connection	Speed at gear ratio [m/s]								
	9:1	12:1	16:1	20:1	24:1	36:1	48:1	64:1	96:1
0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
5	0,09	0,07	0,05	0,04	0,03	0,02	0,02	0,01	0,01
10	0.17	0,13	0,10	0,08	0,07	0,04	0,03	0,02	0,02
15	0,26	0,20	0,15	0,12	0,10	0,07	0,05	0,04	0,02
20	0,35	0,26	0,20	0,16	0,13	0,09	0,07	0,05	0,03
25	0.44	0,33	0.25	0,20	0,16	0,11	0,08	0,06	0,04
30	0,52	0,39	0,29	0,24	0,20	0,13	0,10	0,07	0,05
35	0,61	0,46	0,34	0,27	0.23	0,15	0,11	0,09	0,06
40	0,70	0,52	0,39	0,31	0,26	0.17	0,13	0,10	0,07
45	0,79	0.59	0.44	0,35	0,29	0,20	0,15	0,11	0,07
50	0,87	0,65	0,49	0,39	0,33	0,22	0,16	0,12	0,08
55	0,96	0,72	0,54	0.43	0.36	0,24	0,18	0,13	0,09
60	1,05	0,79	0.59	0,47	0,39	0,26	0,20	0,15	0,10
65	1,13	0.85	0.64	0,51	0.43	0,28	0,21	0,16	0,11
70	1,22	0,92	0,69	0,55	0,46	0,31	0.23	0.17	0,11
75	1,31	0,98	0,74	0.59	0,49	0,33	0.25	0,18	0,12
80	1,40	1,05	0,79	0.63	0,52	0,35	0,26	0,20	0,13
85	1.48	1.11	0,83	0,67	0,56	0.37	0,28	0,21	0,14
90	1,57	1.18	0,88	0,71	0.59	0,39	0,29	0,22	0,15
95	1,66	1,24	0,93	0,75	0,62	0,41	0,31	0.23	0,16
100	1,75	1,31	0,98	0,79	0,65	0.44	0,33	0.25	0,16

EC5000

"Speed" output on "RD" connection	Speed at gear ratio [m/s]								
	9:1	13:1	18:1	21:1	30:1	42:1	49:1	78:1	108:1
0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
5	0,10	0,07	0,05	0,04	0,03	0,02	0,02	0,01	0,01
10	0,20	0,13	0,10	0,09	0,06	0,04	0,04	0,02	0,02
15	0,30	0,20	0,15	0,13	0,09	0,06	0,06	0,03	0,03
20	0,40	0,26	0,20	0,17	0,12	0,09	0,07	0,05	0,03
25	0,50	0,33	0,25	0,22	0,15	0,11	0,09	0,06	0,04
30	0,60	0,39	0,30	0,26	0,18	0,13	0,11	0,07	0,05
35	0,70	0,46	0,35	0,30	0,21	0,15	0,13	0,08	0,06
40	0,80	0,52	0,40	0,34	0,24	0,17	0,15	0,09	0,07
45	0,90	0,59	0,45	0,39	0,27	0,20	0,17	0,10	0,08
50	1,00	0,65	0,50	0,43	0,30	0,22	0,19	0,12	0,09
55	1,11	0,72	0,55	0,47	0,33	0,24	0,20	0,13	0,09
60	1,21	0,79	0,60	0,52	0,36	0,26	0,22	0,14	0,10
65	1,31	0,85	0,65	0,56	0,39	0,28	0,24	0,15	0,11
70	1,41	0,92	0,70	0,60	0,42	0,30	0,26	0,16	0,12
75	1,51	0,98	0,75	0,65	0,45	0,32	0,28	0,17	0,13
80	1,61	1,05	0,80	0,69	0,48	0,34	0,30	0,18	0,14
85	1,71	1,11	0,85	0,73	0,51	0,37	0,31	0,20	0,14
90	1,81	1,18	0,90	0,77	0,54	0,39	0,33	0,21	0,15
95	1,90	1,24	0,95	0,82	0,57	0,41	0,35	0,22	0,16
100	2,01	1,39	1,00	0,86	0,60	0,43	0,37	0,23	0,17

Other signals

The last part of the output process image is divided into three subsections:

- Control inputs overwrite
- Control outputs overwrite
- Handshake signal overwrite

Designation	Byte	Bit	Data type	Comments
ControlInput 1	5	0	BOOL	
ControlInput 2	5	1	BOOL	
ControlInput 3	5	2	BOOL	
ControlInput 4	5	3	BOOL	
ControlInput 5	5	4	BOOL	
ControlInput 6	5	5	BOOL	
ControlInput 7	5	6	BOOL	
ControlInput 8	5	7	BOOL	
DecisionByte	6		BYTE	
ControlOutput 1	7	0	BOOL	
ControlOutput 2	7	1	BOOL	
ControlOutput 3	7	2	BOOL	
ControlOutput 4	7	3	BOOL	
ControlOutput 5	7	4	BOOL	
ControlOutput 6	7	5	BOOL	
ControlOutput 7	7	6	BOOL	
ControlOutput 8	7	7	BOOL	
In up	8	0	BOOL	
In down	8	1	BOOL	
In left	8	2	BOOL	
In right	8	3	BOOL	
Out up	8	4	BOOL	

Process data

Designation	Byte	Bit	Data type	Comments
Out down	8	5	BOOL	
Out left	8	6	BOOL	
Out down	8	5	BOOL	
Out left	8	6	BOOL	
Out right	8	7	BOOL	
Spare	9	0	BOOL	
Spare	9	1	BOOL	
Spare	9	2	BOOL	
Spare	9	3	BOOL	
Spare	9	4	BOOL	
Spare	9	5	BOOL	
Spare	9	6	BOOL	
Spare	9	7	BOOL	

8 Different process images

From firmware version 2.x.xx onwards, different process images can be selected:

- Universal Full (factory setting)
- Universal Compact
- I/O Mode
- Control Mode
- I/O Tiny Mode
- CANopen
- CANopen Pro
- Universal Full BI

These differ in the amount of available data and the associated memory space. This also results in differences with regard to addressing.

Process image for EtherCAT applications

Regardless of the firmware version of the MultiControl, two different XML files are available for the „Universal Full" and „CANopen" process images.

For the process image „Universal Full" (MultiControl AI and BI):

- Interroll MultiControl V2.1.xml

For the process image „CANopen" (MultiControl BI):

- Interroll MultiControl V2.3 CANopen.xml
- Interroll MultiControl V2.4 BI
- Interroll MultiControl V2.4 CANopen Pro

8.1 Process image “Universal Full”

IPI, Input process image “Universal Full”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Sensor 1	BOOL	True = sensor active (input type and polarity can be configured)
0	.1	Sensors	Sensor 2	BOOL	
0	.2	Sensors	Sensor 3	BOOL	
0	.3	Sensors	Sensor 4	BOOL	
0	.4	Sensors	Sensor 5	BOOL	Start sensor zone 1
0	.5	Sensors	Sensor 6	BOOL	Spare
0	.6	Sensors	Sensor 7	BOOL	
0	.7	Sensors	Sensor 8	BOOL	
1	.0	Digital I/O	I/O 1	BOOL	Logical state and voltage level depend on the configuration (NPN/PNP; polarity), state at the input, true/false = sensor occupied/unoccupied
1	.1	Digital I/O	I/O 2	BOOL	
1	.2	Digital I/O	I/O 3	BOOL	
1	.3	Digital I/O	I/O 4	BOOL	
1	.4	Digital I/O	Spare	BOOL	Spare
1	.5	Digital I/O	Spare	BOOL	
1	.6	Digital I/O	Spare	BOOL	
1	.7	Digital I/O	Spare	BOOL	
2	.0	Motor state RD 1	Error 1	BOOL	True = motor error False = motor OK
2	.1	Motor state RD 2	Error 2	BOOL	
2	.2	Motor state RD 3	Error 3	BOOL	
2	.3	Motor state RD 4	Error 4	BOOL	

Input process image „Universal Full"

Byte	Bit	Category	Designation	Type	Comments
3		Motor states RD 1	SpeedPos 1	INT8	Actual target speed/position (-100...0...100 per cent/ -90...0...90, 123...127 degrees)
4		Motor states RD 2	SpeedPos 2	INT8	
5		Motor states RD 3	SpeedPos 3	INT8	
6		Motor states RD 4	SpeedPos 4	INT8	
7		Motor states	LastError	BYTE	Last error
8		Motor states RD 1	MotorCurrent1	UINT16	Average current in mA
10		Motor states RD 2	MotorCurrent2	UINT16	
12		Motor states RD 3	MotorCurrent3	UINT16	
14		Motor states RD 4	MotorCurrent4	UINT16	
16		System state	Voltage_Motor	UINT16	"Motor power" voltage in mV
18		System state	Voltage_Logic	UINT16	"Power logic + sensors" voltage in mV
20		System state	Temperature	INT16	Temperature in 0.1 °C
22		System state	SystemUpTime	UINT32	Operating time in seconds since last start/restart
26	.0	Control inputs	ControlInput 1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
26	.1	Control inputs	ControlInput 2	BOOL	
26	.2	Control inputs	ControlInput 3	BOOL	
26	.3	Control inputs	ControlInput 4	BOOL	
26	.4	Control inputs	ControlInput 5	BOOL	
26	.5	Control inputs	ControlInput 6	BOOL	
26	.6	Control inputs	ControlInput 7	BOOL	
26	.7	Control inputs	ControlInput 8	BOOL	
27		Control inputs	DecisionByte	BYTE	

Different process images

Input process image „Universal Full"

Byte	Bit	Category	Designation	Type	Comments
28	.0	Control outputs	ControlOutput1	BOOL	Meaning depends on selected state table (e.g. "zone busy" for zone control state table)
28	.1	Control outputs	ControlOutput2	BOOL	
28	.2	Control outputs	ControlOutput3	BOOL	
28	.3	Control outputs	ControlOutput4	BOOL	
28	.4	Control outputs	ControlOutput5	BOOL	
28	.5	Control outputs	ControlOutput6	BOOL	
28	.6	Control outputs	ControlOutput7	BOOL	
28	.7	Control outputs	ControlOutput8	BOOL	
29	.0	Handshake signals	In_Up	BOOL	Start signal first zone
29	.1	Handshake signals	In_Down	BOOL	Start signal last zone
29	.2	Handshake Signals	In_Left	BOOL	
29	.3	Handshake Signals	In-Right	BOOL	
29	.4	Handshake signals	Out_Up	BOOL	True = First zone is free
29	.5	Handshake signals	Out_Down	BOOL	True = Last Zone is occupied
29	.6	Handshake signals	Out_Left	BOOL	
29	.7	Handshake signals	Out_Right	BOOL	
30	.0	Zone States	Spare	BOOL	Spare
30	.1	Zone States	Spare	BOOL	Spare
30	.2	Zone States	Spare	BOOL	Spare
30	.3	Zone States	Spare	BOOL	Spare
30	.4	Zone States	Spare	BOOL	Spare
30	.5	Zone States	Spare	BOOL	Spare
30	.6	Zone States	Spare	BOOL	Spare
30	.7	Zone States	Spare	BOOL	Spare
31		Zone states	ZoneError 1	UINT8	0 = OK;
32		Zone states	ZoneError 2	UINT8	≠ 0 = zone error
33		Zone states	ZoneError 3	UINT8	
34		Zone states	ZoneError 4	UINT8	
35		Spare	Spare	BYTE	Spare

OPI, Output process image “Universal Full”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital outputs PLC output	Output 1	BOOL	
0	.1	Digital outputs PLC output	Output 2	BOOL	
0	.2	Digital outputs PLC output	Output 3	BOOL	
0	.3	Digital outputs PLC output	Output 4	BOOL	
1		Motor RD 1	SpeedPos 1	INT8	Target speed/position (-100...0...100 per cent [1] / -90...0...90, 123...127 degrees) BI: „111” = „Zero Motion Hold off” in program ID „I/O Device”
2		Motor RD 2	SpeedPos 2	INT8	
3		Motor RD 3	SpeedPos 3	INT8	
4		Motor RD 4	SpeedPos 4	INT8	
5	.0	Control inputs overwrite	ControlInput1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
5	.1	Control inputs overwrite	ControlInput2	BOOL	
5	.2	Control inputs overwrite	ControlInput3	BOOL	
5	.3	Control inputs overwrite	ControlInput4	BOOL	
5	.4	Control inputs overwrite	ControlInput5	BOOL	
5	.5	Control inputs overwrite	ControlInput6	BOOL	
5	.6	Control inputs overwrite	ControlInput7	BOOL	
5	.7	Control inputs overwrite	ControlInput8	BOOL	
6	.0	Control inputs overwrite	Spare	BYTE	Spare
7	.0	Control outputs overwrite	ControlOutput1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
7	.1	Control outputs overwrite	ControlOutput2	BOOL	
7	.2	Control outputs overwrite	ControlOutput3	BOOL	
7	.3	Control outputs overwrite	ControlOutput4	BOOL	
7	.4	Control outputs overwrite	ControlOutput5	BOOL	
7	.5	Control outputs overwrite	ControlOutput6	BOOL	
7	.6	Control outputs overwrite	ControlOutput7	BOOL	
7	.7	Control outputs overwrite	ControlOutput8	BOOL	

[1] Attention! Speed presets >100 % can lead to a malfunction of the connected RollerDrive!

Output process image „Universal Full"

Byte	Bit	Category	Designation	Type	Comments
8	.0	Handshake signal overwrite	UpIn	BOOL	True/false = zone free/occupied
8	.1	Handshake signal overwrite	DownIn	BOOL	
8	.2	Handshake signal overwrite	LeftIn	BOOL	
8	.3	Handshake signal overwrite	RightIn	BOOL	
8	.4	Handshake signal overwrite	UpOut	BOOL	
8	.5	Handshake signal overwrite	DownOut	BOOL	
8	.6	Handshake signal overwrite	LeftOut	BOOL	
8	.7	Handshake signal overwrite	RightOut	BOOL	
9	.0	Spare	Spare	BOOL	Spare
9	.1	Spare	Spare	BOOL	
9	.2	Spare	Spare	BOOL	
9	.3	Spare	Spare	BOOL	
9	.4	Spare	Spare	BOOL	
9	.5	Spare	Spare	BOOL	
9	.6	Spare	Spare	BOOL	
9	.7	Spare	Spare	BOOL	

8.2 Process image “Universal Compact”

IPI, Input process image “Universal Compact”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Sensor 1	BOOL	True = sensor active (input type and polarity can be configured)
0	.1	Sensors	Sensor 2	BOOL	
0	.2	Sensors	Sensor 3	BOOL	
0	.3	Sensors	Sensor 4	BOOL	
0	.4	Sensors	Sensor 5	BOOL	Start sensor zone 1
0	.5	Sensors	Sensor 6	BOOL	Spare
0	.6	Sensors	Sensor 7	BOOL	
0	.7	Sensors	Sensor 8	BOOL	
1	.0	Digital I/O	I/O 1	BOOL	True = auxiliary input/output active (type and polarity can be configured)
1	.1	Digital I/O	I/O 2	BOOL	
1	.2	Digital I/O	I/O 3	BOOL	
1	.3	Digital I/O	I/O 4	BOOL	
1	.4	Digital I/O	Spare	BOOL	Spare
1	.5	Digital I/O	Spare	BOOL	
1	.6	Digital I/O	Spare	BOOL	
1	.7	Digital I/O	Spare	BOOL	
2	.0	Motor state RD 1	Error 1	BOOL	True = motor error False = motor OK
2	.1	Motor state RD 2	Error 2	BOOL	
2	.2	Motor state RD 3	Error 3	BOOL	
2	.3	Motor state RD 4	Error 4	BOOL	
2	.4	System state	ComFail	BOOL	True = communication error
2	.5	System state	PowerFail	BOOL	True = supply voltage error
2	.6	System state	TempFail	BOOL	True = temperature too high
2	.7	System state	ControlFail	BOOL	True = control system error

Input process image "Universal Compact"

Byte	Bit	Category	Designation	Type	Comments
3		System state	ErrorState	UINT8	Actual error state 1 = ready for operation, 2 = minor error, 3 = severe error
4		System state	LastError	UINT8	Most recent error
5		Motors	SpeedPos1	INT8	Actual target speed/position (-100...0...100 per cent/ -90...0...90, 123...127 degrees)
6		Motors	SpeedPos2	INT8	
7		Motors	SpeedPos3	INT8	
8		Motors	SpeedPos4	INT8	
9	.0	Control inputs	ControlInput1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
9	.1	Control inputs	ControlInput2	BOOL	
9	.2	Control inputs	ControlInput3	BOOL	
9	.3	Control inputs	ControlInput4	BOOL	
9	.4	Control inputs	ControlInput5	BOOL	
9	.5	Control inputs	ControlInput6	BOOL	
9	.6	Control inputs	ControlInput7	BOOL	
9	.7	Control inputs	ControlInput8	BOOL	
10	.0	Control outputs	ControlOutput 1	BOOL	Meaning depends on selected state table (e.g. "zone busy" for zone control state table)
10	.1	Control outputs	ControlOutput 2	BOOL	
10	.2	Control outputs	ControlOutput 3	BOOL	
10	.3	Control outputs	ControlOutput 4	BOOL	
10	.4	Control outputs	ControlOutput 5	BOOL	
10	.5	Control outputs	ControlOutput 6	BOOL	
10	.6	Control outputs	ControlOutput 7	BOOL	
10	.7	Control outputs	ControlOutput 8	BOOL	

Input process image "Universal Compact"

Byte	Bit	Category	Designation	Type	Comments
11	.0	Handshake signals	In_Up	BOOL	True = upstream zone has to transport package
11	.1	Handshake signals	In_Down	BOOL	True = downstream zone is free
11	.2	Handshake signals	In_Left	BOOL	True = left zone has to transport package or left zone is free
11	.3	Handshake signals	In_Right	BOOL	True = right zone has to transport package or right zone is free
11	.4	Handshake signals	Out_Up	BOOL	True = first zone is free
11	.5	Handshake signals	Out_Down	BOOL	True = last zone is occupied
11	.6	Handshake signals	Out_Left	BOOL	True = package available for left zone or Transfer/HPD is occupied
11	.7	Handshake signals	Out_Right	BOOL	True = package available for right zone or Transfer/HPD is occupied
12	.0	Zone state	Spare	BOOL	Spare
12	.1	Zone state	Spare	BOOL	
12	.2	Zone state	Spare	BOOL	
12	.3	Zone state	Spare	BOOL	
12	.4	Zone state	Spare	BOOL	
12	.5	Zone state	Spare	BOOL	
12	.6	Zone state	Spare	BOOL	
12	.7	Zone state	Spare	BOOL	

Input process image “Universal Compact”

Byte	Bit	Category	Designation	Type	Comments
13	.0	Spare	Spare	BOOL	Spare
13	.1	Spare	Spare	BOOL	
13	.2	Spare	Spare	BOOL	
13	.3	Spare	Spare	BOOL	
13	.4	Spare	Spare	BOOL	
13	.5	Spare	Spare	BOOL	
13	.6	Spare	Spare	BOOL	
13	.7	Spare	Spare	BOOL	

OPI, Output process image “Universal Compact”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital I/O	Output 1	BOOL	True = auxiliary output active (output type and polarity can be configured)
0	.1	Digital I/O	Output 2	BOOL	
0	.2	Digital I/O	Output 3	BOOL	
0	.3	Digital I/O	Output 4	BOOL	
0	.4	Digital I/O	Spare	BOOL	Not in use
0	.5	Digital I/O	Spare	BOOL	
0	.6	Digital I/O	Spare	BOOL	
0	.7	Digital I/O	Spare	BOOL	
1		Motors	SpeedPos 1	INT8	Target speed/position (-100...0...100 per cent [1] / -90...0...90, 123...127 degrees) BI: „111” = „Zero Motion Hold off” in program ID „I/O Device”
2		Motors	SpeedPos 2	INT8	
3		Motors	SpeedPos 3	INT8	
4		Motors	SpeedPos 4	INT8	
5	.0	Control inputs overwrite	Control input 1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
5	.1	Control inputs overwrite	Control input 2	BOOL	
5	.2	Control inputs overwrite	Control input 3	BOOL	
5	.3	Control inputs overwrite	Control input 4	BOOL	
5	.4	Control inputs overwrite	Control input 5	BOOL	
5	.5	Control inputs overwrite	Control input 6	BOOL	
5	.6	Control inputs overwrite	Control input 7	BOOL	
5	.7	Control inputs overwrite	Control input 8	BOOL	

[1] Attention! Speed presets >100 % can lead to a malfunction of the connected RollerDrive!

Output process image “Universal Compact”

Byte	Bit	Category	Designation	Type	Comments
6	.0	Control outputs overwrite	Control output 1	BOOL	Meaning depends on selected state table (e.g. "zone busy" for zone control state table)
6	.1	Control outputs overwrite	Control output 2	BOOL	
6	.2	Control outputs overwrite	Control output 3	BOOL	
6	.3	Control outputs overwrite	Control output 4	BOOL	
6	.4	Control outputs overwrite	Control output 5	BOOL	
6	.5	Control outputs overwrite	Control output 6	BOOL	
6	.6	Control outputs overwrite	Control output 7	BOOL	
6	.7	Control outputs overwrite	Control output 8	BOOL	
7	.0	Handshake signal overwrite	UpIn	BOOL	True = upstream zone has to transport package
7	.1	Handshake signal overwrite	DownIn	BOOL	True = downstream zone is free
7	.2	Handshake signal overwrite	LeftIn	BOOL	True = left zone has to transport package or left zone is free
7	.3	Handshake signal overwrite	RightIn	BOOL	True = right zone has to transport package or right zone is free
7	.4	Handshake signal overwrite	UpOut	BOOL	True = package available at output of last zone
7	.5	Handshake signal overwrite	DownOut	BOOL	True = first zone is occupied
7	.6	Handshake signal overwrite	LeftOut	BOOL	True = package available for left zone or Transfer/HPD is occupied
7	.7	Handshake signal overwrite	RightOut	BOOL	True = package available for right zone or Transfer/HPD is occupied

Output process image “Universal Compact”

Byte	Bit	Category	Designation	Type	Comments
8	.0	Spare	Spare	BOOL	Spare
8	.1	Spare	Spare	BOOL	
8	.2	Spare	Spare	BOOL	
8	.3	Spare	Spare	BOOL	
8	.4	Spare	Spare	BOOL	
8	.5	Spare	Spare	BOOL	
8	.6	Spare	Spare	BOOL	
8	.7	Spare	Spare	BOOL	

8.3 Process image “I/O Mode”

IPI, Input process image “I/O Mode”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Sensor 1	BOOL	True = sensor active (input type and polarity can be configured)
0	.1	Sensors	Sensor 2	BOOL	
0	.2	Sensors	Sensor 3	BOOL	
0	.3	Sensors	Sensor 4	BOOL	
0	.4	Sensors	Sensor 5	BOOL	
0	.5	Sensors	Sensor 6	BOOL	
0	.6	Sensors	Sensor 7	BOOL	
0	.7	Sensors	Sensor 8	BOOL	
1	.0	Digital I/O	I/O 1	BOOL	True = auxiliary input/output active (type and polarity can be configured)
1	.1	Digital I/O	I/O 2	BOOL	
1	.2	Digital I/O	I/O 3	BOOL	
1	.3	Digital I/O	I/O 4	BOOL	
1	.4	Digital I/O	Spare	BOOL	Spare
1	.5	Digital I/O	Spare	BOOL	
1	.6	Digital I/O	Spare	BOOL	
1	.7	Digital I/O	Spare	BOOL	
2	.0	Motor state RD 1	Error 1	BOOL	True = motor error False = motor OK
2	.1	Motor state RD 2	Error 2	BOOL	
2	.2	Motor state RD 3	Error 3	BOOL	
2	.3	Motor state RD 4	Error 4	BOOL	
2	.4	System state	ComFail	BOOL	True = communication error
2	.5	System state	PowerFail	BOOL	True = supply voltage error
2	.6	System state	TempFail	BOOL	True = temperature too high
2	.7	System state	ControlFail	BOOL	True = control system error

Input process image “I/O Mode”

Byte	Bit	Category	Designation	Type	Comments
3		System state	ErrorState	UINT8	Actual error state 1 = ready for operation, 2 = minor error, 3 = severe error
4		System state	LastError	UINT8	Most recent error
5		Motors	SpeedPos1	INT8	Actual target speed/position (-100...0...100 per cent/ -90...0...90, 123...127 degrees)
6		Motors	SpeedPos2	INT8	
7		Motors	SpeedPos3	INT8	
8		Motors	SpeedPos4	INT8	

OPI, Output process image “I/O Mode”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital I/O	Output 1	BOOL	True = auxiliary output active (output type and polarity can be configured)
0	.1	Digital I/O	Output 2	BOOL	
0	.2	Digital I/O	Output 3	BOOL	
0	.3	Digital I/O	Output 4	BOOL	
0	.4	Digital I/O	Spare	BOOL	Not in use
0	.5	Digital I/O	Spare	BOOL	
0	.6	Digital I/O	Spare	BOOL	
0	.7	Digital I/O	Spare	BOOL	
1		Motors	SpeedPos 1	INT8	Target speed/position (-100...0...100 per cent [1] / -90...0...90, 123...127 degrees) BI: „111” = „Zero Motion Hold off” in program ID „I/O Device”
2		Motors	SpeedPos 2	INT8	
3		Motors	SpeedPos 3	INT8	
4		Motors	SpeedPos 4	INT8	

[1] Attention! Speed presets >100 % can lead to a malfunction of the connected RollerDrive!

8.4 Process image “Control Mode”

IPI, Input process image “Control Mode”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Sensor 1	BOOL	True = sensor active (input type and polarity can be configured)
0	.1	Sensors	Sensor 2	BOOL	
0	.2	Sensors	Sensor 3	BOOL	
0	.3	Sensors	Sensor 4	BOOL	
0	.4	Sensors	Sensor 5	BOOL	
0	.5	Sensors	Sensor 6	BOOL	
0	.6	Sensors	Sensor 7	BOOL	
0	.7	Sensors	Sensor 8	BOOL	
1	.0	Motor state RD 1	Error 1	BOOL	True = motor error False = motor OK
1	.1	Motor state RD 2	Error 2	BOOL	
1	.2	Motor state RD 3	Error 3	BOOL	
1	.3	Motor state RD 4	Error 4	BOOL	
1	.4	System state	ComFail	BOOL	True = communication error
1	.5	System state	PowerFail	BOOL	True = supply voltage error
1	.6	System state	TempFail	BOOL	True = temperature too high
1	.7	System state	ControlFail	BOOL	True = control system error
2		System state	ErrorState	UINT8	Actual error state 1 = ready for operation, 2 = minor error, 3 = severe error
3		System state	LastError	UINT8	Most recent error

Different process images

Input process image “Control Mode”

Byte	Bit	Category	Designation	Type	Comments
4	.0	Control inputs	ControlInput1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
4	.1	Control inputs	ControlInput2	BOOL	
4	.2	Control inputs	ControlInput3	BOOL	
4	.3	Control inputs	ControlInput4	BOOL	
4	.4	Control inputs	ControlInput5	BOOL	
4	.5	Control inputs	ControlInput6	BOOL	
4	.6	Control inputs	ControlInput7	BOOL	
4	.7	Control inputs	ControlInput8	BOOL	
5	.0	Control outputs	ControlOutput 1	BOOL	Meaning depends on selected state table (e.g. "zone busy" for zone control state table)
5	.1	Control outputs	ControlOutput 2	BOOL	
5	.2	Control outputs	ControlOutput 3	BOOL	
5	.3	Control outputs	ControlOutput 4	BOOL	
5	.4	Control outputs	ControlOutput 5	BOOL	
5	.5	Control outputs	ControlOutput 6	BOOL	
5	.6	Control outputs	ControlOutput 7	BOOL	
5	.7	Control outputs	ControlOutput 8	BOOL	

Input process image "Control Mode"

Byte	Bit	Category	Designation	Type	Comments
6	.0	Handshake signals	In_Up	BOOL	True = upstream zone has to transport package
6	.1	Handshake signals	In_Down	BOOL	True = downstream zone is free
6	.2	Handshake signals	In_Left	BOOL	True = left zone has to transport package or left zone is free
6	.3	Handshake signals	In_Right	BOOL	True = right zone has to transport package or right zone is free
6	.4	Handshake signals	Out_Up	BOOL	True = first zone is free
6	.5	Handshake signals	Out_Down	BOOL	True = last zone is occupied
6	.6	Handshake signals	Out_Left	BOOL	True = package available for left zone or Transfer/HPD is occupied
6	.7	Handshake signals	Out_Right	BOOL	True = package available for right zone or Transfer/HPD is occupied
7	.0	Zone state	Spare	BOOL	Spare
7	.1	Zone state	Spare	BOOL	
7	.2	Zone state	Spare	BOOL	
7	.3	Zone state	Spare	BOOL	
7	.4	Zone state	Spare	BOOL	
7	.5	Zone state	Spare	BOOL	
7	.6	Zone state	Spare	BOOL	
7	.7	Zone state	Spare	BOOL	
8	.0	Spare	Spare	BOOL	Spare
8	.1	Spare	Spare	BOOL	
8	.2	Spare	Spare	BOOL	
8	.3	Spare	Spare	BOOL	
8	.4	Spare	Spare	BOOL	
8	.5	Spare	Spare	BOOL	
8	.6	Spare	Spare	BOOL	
8	.7	Spare	Spare	BOOL	

OPI, Output process image “Control Mode”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Control inputs overwrite	Control input 1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
0	.1	Control inputs overwrite	Control input 2	BOOL	
0	.2	Control inputs overwrite	Control input 3	BOOL	
0	.3	Control inputs overwrite	Control input 4	BOOL	
0	.4	Control inputs overwrite	Control input 5	BOOL	
0	.5	Control inputs overwrite	Control input 6	BOOL	
0	.6	Control inputs overwrite	Control input 7	BOOL	
0	.7	Control inputs overwrite	Control input 8	BOOL	
1	.0	Control outputs overwrite	Control output 1	BOOL	Meaning depends on selected state table (e.g. "zone busy" for zone control state table)
1	.1	Control outputs overwrite	Control output 2	BOOL	
1	.2	Control outputs overwrite	Control output 3	BOOL	
1	.3	Control outputs overwrite	Control output 4	BOOL	
1	.4	Control outputs overwrite	Control output 5	BOOL	
1	.5	Control outputs overwrite	Control output 6	BOOL	
1	.6	Control outputs overwrite	Control output 7	BOOL	
1	.7	Control outputs overwrite	Control output 8	BOOL	

Output process image "Control Mode"

Byte	Bit	Category	Designation	Type	Comments
2	.0	Handshake signal overwrite	UpIn	BOOL	True = upstream zone has to transport package
2	.1	Handshake signal overwrite	DownIn	BOOL	True = downstream zone is free
2	.2	Handshake signal overwrite	LeftIn	BOOL	True = left zone has to transport package or left zone is free
2	.3	Handshake signal overwrite	RightIn	BOOL	True = right zone has to transport package or right zone is free
2	.4	Handshake signal overwrite	UpOut	BOOL	True = package available at output of last zone
2	.5	Handshake signal overwrite	DownOut	BOOL	True = first zone is occupied
2	.6	Handshake signal overwrite	LeftOut	BOOL	True = package available for left zone or Transfer/HPD is occupied
2	.7	Handshake signal overwrite	RightOut	BOOL	True = package is available for right zone or Transfer/HPD is occupied
3	.0	Spare	Spare	BOOL	Spare
3	.1	Spare	Spare	BOOL	
3	.2	Spare	Spare	BOOL	
3	.3	Spare	Spare	BOOL	
3	.4	Spare	Spare	BOOL	
3	.5	Spare	Spare	BOOL	
3	.6	Spare	Spare	BOOL	
3	.7	Spare	Spare	BOOL	

8.5 Process image “I/O Tiny Mode”

IPI, Input process image “I/O Tiny Mode”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Sensor 1	BOOL	True = sensor active (input type and polarity can be configured)
0	.1	Sensors	Sensor 2	BOOL	
0	.2	Sensors	Sensor 3	BOOL	
0	.3	Sensors	Sensor 4	BOOL	
0	.4	Sensors	Sensor 5	BOOL	
0	.5	Sensors	Sensor 6	BOOL	
0	.6	Sensors	Sensor 7	BOOL	
0	.7	Sensors	Sensor 8	BOOL	
1	.0	Digital I/O	I/O 1	BOOL	True = auxiliary input/output active (type and polarity can be configured)
1	.1	Digital I/O	I/O 2	BOOL	
1	.2	Digital I/O	I/O 3	BOOL	
1	.3	Digital I/O	I/O 4	BOOL	
1	.4	Digital I/O	Spare	BOOL	Spare
1	.5	Digital I/O	Spare	BOOL	Spare
1	.6	Digital I/O	Spare	BOOL	Spare
1	.7	Digital I/O	Spare	BOOL	Spare
2	.0	Motors	MotorError 1	BOOL	True = motor error
2	.1	Motors	MotorOn 1	BOOL	True = motor running
2	.2	Motors	MotorV2 1	BOOL	True = speed V2 selected
2	.3	Motors	MotorDir 1	BOOL	True = reverse main direction
2	.4	Motors	MotorError 2	BOOL	True = motor error
2	.5	Motors	MotorOn 2	BOOL	True = motor running
2	.6	Motors	MotorV2 2	BOOL	True = speed V2 selected
2	.7	Motors	MotorDir 2	BOOL	True = reverse main direction

Input process image "I/O Tiny Mode"

Byte	Bit	Category	Designation	Type	Comments
3	.0	Motors	MotorError 3	BOOL	True = motor error
3	.1	Motors	MotorOn 3	BOOL	True = motor running
3	.2	Motors	MotorV2 3	BOOL	True = speed V2 selected
3	.3	Motors	MotorDir 3	BOOL	True = reverse main direction
3	.4	Motors	MotorError 4	BOOL	True = motor error
3	.5	Motors	MotorOn 4	BOOL	True = motor running
3	.6	Motors	MotorV2 4	BOOL	True = speed V2 selected
3	.7	Motors	MotorDir 4	BOOL	True = reverse main direction
4	.0	Motor states RD 1	Error 1	BOOL	True = motor error, False = motor OK
4	.1	Motor states RD 2	Error 2	BOOL	
4	.2	Motor states RD 3	Error 3	BOOL	
4	.3	Motor states RD 4	Error 4	BOOL	
4	.4	System state	BusComError	BOOL	True = BusCom error
4	.5	System state	VoltageError	BOOL	True = voltage error
4	.6	System state	TemperatureError	BOOL	True = temperature error
4	.7	System state	ControlError	BOOL	True = control system error

OPI, Output process image “I/O Tiny Mode”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital I/O	Output 1	BOOL	True = auxiliary output active (output type and polarity can be configured)
0	.1	Digital I/O	Output 2	BOOL	
0	.2	Digital I/O	Output 3	BOOL	
0	.3	Digital I/O	Output 4	BOOL	
0	.4	Digital I/O	Spare	BOOL	Not in use
0	.5	Digital I/O	Spare	BOOL	
0	.6	Digital I/O	Spare	BOOL	
0	.7	Digital I/O	Spare	BOOL	
1	.0	Motors	Spare	BOOL	Not in use
1	.1	Motors	MotorOn 1	BOOL	True = motor running
1	.2	Motors	MotorV2 1	BOOL	True = speed V2 selected
1	.3	Motors	MotorDir 1	BOOL	True = reverse main direction
1	.4	Motors	Spare	BOOL	Not in use
1	.5	Motors	MotorOn 2	BOOL	True = motor running
1	.6	Motors	MotorV2 2	BOOL	True = speed V2 selected
1	.7	Motors	MotorDir 2	BOOL	True = reverse main direction
2	.0	Motors	Spare	BOOL	Not in use
2	.1	Motors	MotorOn 3	BOOL	True = motor running
2	.2	Motors	MotorV2 3	BOOL	True = speed V2 selected
2	.3	Motors	MotorDir 3	BOOL	True = reverse main direction
2	.4	Motors	Spare	BOOL	Not in use
2	.5	Motors	MotorOn 4	BOOL	True = motor running
2	.6	Motors	MotorV2 4	BOOL	True = speed V2 selected
2	.7	Motors	MotorDir 4	BOOL	True = reverse main direction

8.6 Process image “CANopen”

IPI, Input process image “CANopen”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Sensor 1	BOOL	True = sensor active (input type and polarity can be configured)
0	.1	Sensors	Sensor 2	BOOL	
0	.2	Sensors	Sensor 3	BOOL	
0	.3	Sensors	Sensor 4	BOOL	
0	.4	Sensors	Sensor 5	BOOL	
0	.5	Sensors	Sensor 6	BOOL	
0	.6	Sensors	Sensor 7	BOOL	
0	.7	Sensors	Sensor 8	BOOL	
1	.0	Digital I/O	I/O 1	BOOL	True = auxiliary input/output active (type and polarity can be configured)
1	.1	Digital I/O	I/O 2	BOOL	
1	.2	Digital I/O	I/O 3	BOOL	
1	.3	Digital I/O	I/O 4	BOOL	
1	.4	Digital I/O	Spare	BOOL	Spare
1	.5	Digital I/O	Spare	BOOL	Spare
1	.6	Digital I/O	Spare	BOOL	Spare
1	.7	Digital I/O	Spare	BOOL	Spare
2		CANopen drive	OprModeDisp 1	INT8	CANopen drive operating mode 1 = positioning mode 3 = speed mode 6 = homing
3		CANopen drive	OprModeDisp 2	INT8	
4		CANopen drive	OprModeDisp 3	INT8	
5		CANopen drive	OprModeDisp 4	INT8	
6		CANopen drive	StatusWord 1	UINT16	CANopen drive status word as per CiA DS-402
8		CANopen drive	StatusWord 2	UINT16	
10		CANopen drive	StatusWord 3	UINT16	
12		CANopen drive	StatusWord 4	UINT16	

For the process image „CANopen”, the direction of rotation „clockwise” (factory setting) must be selected in the presettings!

Different process images

Input process image “CANopen”

Byte	Bit	Category	Designation	Type	Comments
14		CANopen drive	ActualVelocity 1	INT32	Actual speed in mm/s
18		CANopen drive	ActualVelocity 2	INT32	
22		CANopen drive	ActualVelocity 3	INT32	
26		CANopen drive	ActualVelocity 4	INT32	
30		CANopen drive	ActualPosition 1	INT32	Actual position in mm
34		CANopen drive	ActualPosition 2	INT32	
38		CANopen drive	ActualPosition 3	INT32	
42		CANopen drive	ActualPosition 4	INT32	
46		MotorStates	MotTemperature 1	INT16	Motor temperature in 0.1 °C
48		MotorStates	MotTemperature 2	INT16	
50		MotorStates	MotTemperature 3	INT16	
52		MotorStates	MotTemperature 4	INT16	
54		MotorStates	MotTorque 1	INT16	Motor torque in mNm
56		MotorStates	MotTorque 2	INT16	
58		MotorStates	MotTorque 3	INT16	
60		MotorStates	MotTorque 4	INT16	
62		SystemState	Voltage_Motor	UINT16	Drive supply voltage in mV
64		SystemState	Voltage_Logic	UINT16	Logic supply voltage in mV
66		SystemState	Temperature	INT16	Temperature in 0.1 °C
68		SystemState	SystemUpTime	UINT32	Runtime since restart/control voltage on

OPI, Output process image “CANopen”

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital I/O	Output 1	BOOL	True = auxiliary output active (output type and polarity can be configured)
0	.1	Digital I/O	Output 2	BOOL	
0	.2	Digital I/O	Output 3	BOOL	
0	.3	Digital I/O	Output 4	BOOL	
0	.4	Digital I/O	Spare	BOOL	Not in use
0	.5	Digital I/O	Spare	BOOL	
0	.6	Digital I/O	Spare	BOOL	
0	.7	Digital I/O	Spare	BOOL	
1		Reserved	Spare	BYTE	
2		CANopen drive	OprMode 1	INT8	CANopen drive operating mode 1 = positioning mode 3 = speed mode 6 = homing
3		CANopen drive	OprMode 2	INT8	
4		CANopen drive	OprMode 3	INT8	
5		CANopen drive	OprMode 4	INT8	
6		CANopen drive	ControlWord 1	UINT16	CANopen drive control word as per CiA DS-402
8		CANopen drive	ControlWord 2	UINT16	
10		CANopen drive	ControlWord 3	UINT16	
12		CANopen drive	ControlWord 4	UINT16	
14		CANopen drive	TargetVelocity 1	INT32	Target speed in mm/s
18		CANopen drive	TargetVelocity 2	INT32	
22		CANopen drive	TargetVelocity 3	INT32	
26		CANopen drive	TargetVelocity 4	INT32	
30		CANopen drive	TargetPosition 1	INT32	Target position in mm
34		CANopen drive	TargetPosition 2	INT32	
38		CANopen drive	TargetPosition 3	INT32	
42		CANopen drive	TargetPosition 4	INT32	

8.7 Process image „CANopen Pro"

IPI, Input process image „CANopen Pro"

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Sensor 1	BOOL	True = sensor active (input type and polarity can be configured)
0	.1	Sensors	Sensor 2	BOOL	
0	.2	Sensors	Sensor 3	BOOL	
0	.3	Sensors	Sensor 4	BOOL	
0	.4	Sensors	Sensor 5	BOOL	
0	.5	Sensors	Sensor 6	BOOL	
0	.6	Sensors	Sensor 7	BOOL	
0	.7	Sensors	Sensor 8	BOOL	
1	.0	Digital I/O	I/O 1	BOOL	True = auxiliary input/output active (type and polarity can be configured)
1	.1	Digital I/O	I/O 2	BOOL	
1	.2	Digital I/O	I/O 3	BOOL	
1	.3	Digital I/O	I/O 4	BOOL	
1	.4	Digital I/O	Spare	BOOL	Spare
1	.5	Digital I/O	Spare	BOOL	Spare
1	.6	Digital I/O	Spare	BOOL	Spare
1	.7	Digital I/O	Spare	BOOL	Spare
2		CANopen Drive	OprModeDisp 1	INT8	CANopen drive operating mode 1 = positioning mode 3 = speed mode 6 = homing
3		CANopen Drive	OprModeDisp 2	INT8	
4		CANopen Drive	OprModeDisp 3	INT8	
5		CANopen Drive	OprModeDisp 4	INT8	
6		CANopen Drive	StatusWord 1	UINT16	CANopen drive status word as per CiA DS-402
8		CANopen Drive	StatusWord 2	UINT16	
10		CANopen Drive	StatusWord 3	UINT16	
12		CANopen Drive	StatusWord 4	UINT16	

For the process image „CANopen Pro", the direction of rotation „clockwise" (factory setting) must be selected in the presettings!

Input process image „CANopen Pro"

Byte	Bit	Category	Designation	Type	Comments
14		CANopen Drive	ActualVelocity 1	INT32	Actual speed in mm/s
18		CANopen Drive	ActualVelocity 2	INT32	
22		CANopen Drive	ActualVelocity 3	INT32	
26		CANopen Drive	ActualVelocity 4	INT32	
30		CANopen Drive	ActualPosition 1	INT32	Actual position in mm
34		CANopen Drive	ActualPosition 2	INT32	
38		CANopen Drive	ActualPosition 3	INT32	
42		CANopen Drive	ActualPosition 4	INT32	
46		MotorStates	MotTemperature 1	INT16	Motor temperature in 0.1 °C
48		MotorStates	MotTemperature 2	INT16	
50		MotorStates	MotTemperature 3	INT16	
52		MotorStates	MotTemperature 4	INT16	
54		MotorStates	MotTorque 1	INT16	Motor torque in mNm
56		MotorStates	MotTorque 2	INT16	
58		MotorStates	MotTorque 3	INT16	
60		MotorStates	MotTorque 4	INT16	
62		SystemState	Voltage_Motor	UINT16	Drive supply voltage in mV
64		SystemState	Voltage_Logic	UINT16	Logic supply voltage in mV
66		SystemState	Temperature	INT16	Temperature in 0.1 °C
68		SystemState	SystemUpTime	UINT32	Runtime since restart/control voltage on
72		SystemState	LastError	INT8	Last error
73		SystemState		INT8	

Different process images

Input process image „CANopen Pro"

Byte	Bit	Category	Designation	Type	Comments
74		MotorMonit	Monitoring 1	UINT8	Bit 0,1: Lifetime Bit 2,3: Temperature Bit 4,5: Power Bit 6,7: Error
75		MotorMonit	Monitoring 2	UINT8	
76		MotorMonit	Monitoring 3	UINT8	
77		MotorMonit	Monitoring 4	UINT8	

Lifetime		Bit 0	Bit 1	Temperature		Bit 2	Bit 3	Power		Bit 4	Bit 5	Error		Bit 6	Bit 7
						1	1			1	1			1	1
		1	0			1	0			1	0			1	0
		0	0			0	0			0	0			0	0

OPI, Output process image „CANopen Pro"

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital I/O	Output 1	BOOL	True = auxiliary output active (output type and polarity can be configured)
0	.1	Digital I/O	Output 2	BOOL	
0	.2	Digital I/O	Output 3	BOOL	
0	.3	Digital I/O	Output 4	BOOL	
0	.4	Digital I/O	Spare	BOOL	Not in use
0	.5	Digital I/O	Spare	BOOL	
0	.6	Digital I/O	Spare	BOOL	
0	.7	Digital I/O	Spare	BOOL	
1		Reserved	Spare	BYTE	
2		CANopen Drive	OprMode 1	INT8	CANopen drive operating mode 1 = positioning mode 3 = speed mode 6 = homing
3		CANopen Drive	OprMode 2	INT8	
4		CANopen Drive	OprMode 3	INT8	
5		CANopen Drive	OprMode 4	INT8	
6		CANopen Drive	ControlWord 1	UINT16	CANopen drive control word as per CiA DS-402
8		CANopen Drive	ControlWord 2	UINT16	
10		CANopen Drive	ControlWord 3	UINT16	
12		CANopen Drive	ControlWord 4	UINT16	
14		CANopen Drive	TargetVelocity 1	INT32	Target speed in mm/s
18		CANopen Drive	TargetVelocity 2	INT32	
22		CANopen Drive	TargetVelocity 3	INT32	
26		CANopen Drive	TargetVelocity 4	INT32	
30		CANopen Drive	TargetPosition 1	INT32	Target position in mm
34		CANopen Drive	TargetPosition 2	INT32	
38		CANopen Drive	TargetPosition 3	INT32	
42		CANopen Drive	TargetPosition 4	INT32	
46			Spare	INT8	

8.8 Process image „Universal Full BI"

IPI, Input process image „CANopen Pro" „Universal Full BI"

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Sensor 1	BOOL	True = sensor active (input type and polarity can be configured)
0	.1	Sensors	Sensor 2	BOOL	
0	.2	Sensors	Sensor 3	BOOL	
0	.3	Sensors	Sensor 4	BOOL	
0	.4	Sensors	Sensor 5	BOOL	Start sensor zone 1
0	.5	Sensors	Sensor 6	BOOL	
0	.6	Sensors	Sensor 7	BOOL	
0	.7	Sensors	Sensor 8	BOOL	
1	.0	Digital I/O	I/O 1	BOOL	True = auxiliary input/output active (type and polarity can be configured)
1	.1	Digital I/O	I/O 2	BOOL	
1	.2	Digital I/O	I/O 3	BOOL	
1	.3	Digital I/O	I/O 4	BOOL	
1	.4	Digital I/O	Spare	BOOL	Spare
1	.5	Digital I/O	Spare	BOOL	Spare
1	.6	Digital I/O	Spare	BOOL	Spare
1	.7	Digital I/O	Spare	BOOL	Spare
2	.0	MotorState		BOOL	True = Motor error False = Motor OK
2	.1	MotorState		BOOL	
2	.2	MotorState		BOOL	
2	.3	MotorState		BOOL	
3		MotorStates		INT8	Speed 0-100 Negative numbers reverse the direction of rotation
4		MotorStates		INT8	
5		MotorStates		INT8	
6		MotorStates		INT8	

For the process image „Universal Full BI", the direction of rotation „clockwise" (factory setting) must be selected in the presettings!

Input process image „Universal Full BI"

Byte	Bit	Category	Designation	Type	Comments
7		System	LastError	BYTE	Last error
8		MotorStates		UINT16	Average current in mA
10		MotorStates		UINT16	
12		MotorStates		UINT16	
14		MotorStates		UINT16	
16		SystemState	Voltage_Motor	UINT16	Drive supply voltage in mV
18		SystemState	Voltage_Logic	UINT16	Logic supply voltage in mV
20		SystemState	Temperature	INT16	Temperature in 0.1 °C
22		SystemState	SystemUpTime	UINT32	Runtime since restart/control voltage on
26	.0	ControlInputs	Control Input 1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
26	.1	ControlInputs	Control Input 2	BOOL	
26	.2	ControlInputs	Control Input 3	BOOL	
26	.3	ControlInputs	Control Input 4	BOOL	
26	.4	ControlInputs	Control Input 5	BOOL	
26	.5	ControlInputs	Control Input 6	BOOL	
26	.6	ControlInputs	Control Input 7	BOOL	
26	.7	ControlInputs	Control Input 8	BOOL	
27		ControlInputs	Decision Byte	BYTE	
28	.0	ControlOutputs	Control Output 1	BOOL	Meaning depends on selected state table (e.g. "zone busy" for zone control state table)
28	.1	ControlOutputs	Control Output 2	BOOL	
28	.2	ControlOutputs	Control Output 3	BOOL	
28	.3	ControlOutputs	Control Output 4	BOOL	
28	.4	ControlOutputs	Control Output 5	BOOL	
28	.5	ControlOutputs	Control Output 6	BOOL	
28	.6	ControlOutputs	Control Output 7	BOOL	
28	.7	ControlOutputs	Control Output 8	BOOL	

Different process images

Input process image „Universal Full BI"

Byte	Bit	Category	Designation	Type	Comments
29	.0	Handshake Signals Overwrite	InUp	BOOL	Start signal first zone
29	.1	Handshake Signals Overwrite	InDown	BOOL	Start signal last zone
29	.2	Handshake Signals Overwrite	InLeft	BOOL	True / False = Zone occupied / free
29	.3	Handshake Signals Overwrite	InRight	BOOL	
29	.4	Handshake Signals Overwrite	OutUp	BOOL	
29	.5	Handshake Signals Overwrite	OutDown	BOOL	
29	.6	Handshake Signals Overwrite	OutLeft	BOOL	
29	.7	Handshake Signals Overwrite	OutRight	BOOL	
30	.0	ZoneState	Spare	BOOL	
30	.1	ZoneState	Spare	BOOL	
30	.2	ZoneState	Spare	BOOL	
30	.3	ZoneState	Spare	BOOL	
30	.4	ZoneState	Spare	BOOL	
30	.5	ZoneState	Spare	BOOL	
30	.6	ZoneState	Spare	BOOL	
30	.7	ZoneState	Spare	BOOL	
31		MotorMonit	Monitoring 1	UINT8	Bit 0,1: Lifetime
32		MotorMonit	Monitoring 2	UINT8	Bit 2,3: Temperature
33		MotorMonit	Monitoring 3	UINT8	Bit 4,5: Power
34		MotorMonit	Monitoring 4	UINT8	Bit 6,7: Error

Lifetime		Bit 0	Bit 1	Temperature		Bit 2	Bit 3	Power		Bit 4	Bit 5	Error		Bit 6	Bit 7
						1	1			1	1			1	1
		1	0			1	0			1	0			1	0
		0	0			0	0			0	0			0	0

OPI, Output process image „Universal Full BI"

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital I/O	Output 1	BOOL	True = auxiliary output active (output type and polarity can be configured)
0	.1	Digital I/O	Output 2	BOOL	
0	.2	Digital I/O	Output 3	BOOL	
0	.3	Digital I/O	Output 4	BOOL	
1		Motor	RD1 Speed	INT8	Speed 0-100 0 = Stop, 100 = Max. speed
2		Motor	RD2 Speed	INT8	
3		Motor	RD3 Speed	INT8	
4		Motor	RD4 Speed	INT8	
5	.0	Control Inputs Overwrite	Control Input 1	BOOL	Meaning depends on selected state table (e.g. "stop zone" for zone control state table)
5	.1	Control Inputs Overwrite	Control Input 2	BOOL	
5	.2	Control Inputs Overwrite	Control Input 3	BOOL	
5	.3	Control Inputs Overwrite	Control Input 4	BOOL	
5	.4	Control Inputs Overwrite	Control Input 5	BOOL	
5	.5	Control Inputs Overwrite	Control Input 6	BOOL	
5	.6	Control Inputs Overwrite	Control Input 7	BOOL	
5	.7	Control Inputs Overwrite	Control Input 8	BOOL	
6		Control Inputs Overwrite	Reserve	Byte	
7	.0	Control Outputs Overwrite	Control Output 1	BOOL	Meaning depends on selected state table (e.g. "zone busy" for zone control state table)
7	.1	Control Outputs Overwrite	Control Output 2	BOOL	
7	.2	Control Outputs Overwrite	Control Output 3	BOOL	
7	.3	Control Outputs Overwrite	Control Output 4	BOOL	
7	.4	Control Outputs Overwrite	Control Output 5	BOOL	
7	.5	Control Outputs Overwrite	Control Output 6	BOOL	
7	.6	Control Outputs Overwrite	Control Output 7	BOOL	
7	.7	Control Outputs Overwrite	Control Output 8	BOOL	

Output process image „Universal Full BI"

Byte	Bit	Category	Designation	Type	Comments
8	.0	Handshake Signal Overwrite		BOOL	True / False = Zone free / occupied
8	.1	Handshake Signal Overwrite		BOOL	
8	.2	Handshake Signal Overwrite		BOOL	
8	.3	Handshake Signal Overwrite		BOOL	
8	.4	Handshake Signal Overwrite		BOOL	
8	.5	Handshake Signal Overwrite		BOOL	
8	.6	Handshake Signal Overwrite		BOOL	
8	.7	Handshake Signal Overwrite		BOOL	
9	.0			BOOL	Spare
9	.1			BOOL	Spare
9	.2			BOOL	Spare
9	.3			BOOL	Spare
9	.4			BOOL	Spare
9	.5			BOOL	Spare
9	.6			BOOL	Spare
9	.7			BOOL	Spare
10				Byte	Spare

9 I/O configuration

No.	Value	Designation	Comments
1	0	None	I/O not in use
2	1	PLC input	Input signal to PLC
3	2	PLC output	Output signal from PLC
4	15	Sensor 5	Additional inputs can also be found in the corresponding place in the process image.
5	16	Sensor 6	
6	17	Sensor 7	
7	18	Sensor 8	
8	19	Dirt detect sensor	Use Aux-Input near sensor
9	20	Output error	Output state "Severe error"
10	21	Control input 1	Input 1
11	22	Control input 2	Input 2
12	23	Control input 3	Input 3
13	24	Control input 4	Input 4
14	25	Control input 5	Input 5
15	26	Control input 6	Input 6
16	27	Control input 7	Input 7
17	28	Control input 8	Input 8
18	31	Control output 1	Output 1 state
19	32	Control output 2	Output 2 state
20	33	Control output 3	Output 3 state
21	34	Control output 4	Output 4 state
22	35	Control output 5	Output 5 state
23	36	Control output 6	Output 6 state
24	37	Control output 7	Output 7 state
25	38	Control output 8	Output 8 state
26	41	Handshake InUp	Handshake from upstream module
27	42	Handshake InDown	Handshake from downstream module

No.	Value	Designation	Comments
28	43	Handshake InSide 1	Handshake from left module
29	44	Handshake InSide 2	Handshake from right module
30	45	Handshake OutUp	Handshake to upstream module
31	46	Handshake OutDown	Handshake to downstream module
32	47	Handshake OutSide 1	Handshake to left module
33	48	Handshake OutSide 2	Handshake to right module
39	61	VDCErrorIn 1	VDC motor 1 error input
40	62	VDCErrorIn 2	VDC motor 2 error input
41	63	VDCDirectionOut 1	VDC motor 1 direction output
42	64	VDCDirectionOut 2	VDC motor 2 direction output
43	65	VDCStepPulseOut 1	VDC motor 1 step pulse output
44	66	VDCStepPulseOut 2	VDC motor 2 step pulse output

10 Description of control programs

Selection via user interface page "Control program/Control program selection/Program ID".

ZPA programs with stop function for straight sections and curves

The "Single release" and "Train release" programs enable conveying with zero pressure accumulation.

The material to be conveyed is held back until the following zone is detected to be "free" by the logic.

If the material to be conveyed accumulates, a signal is sent to the relevant upstream zone which causes the material to be conveyed to be held back. There is always a gap between the different items of material to be conveyed and no accumulation pressure builds up.

For single release, release takes place in individual zones. For train release, release takes place in blocks so that all associated zones become free at nearly the same time.

A MultiControl can control up to four zones in the ZPA programs. Each zone can be stopped with an input signal or a PLC.

The conveying process goes from upstream to downstream.

Zone 1 is always the starting zone. It is not possible to configure another zone as the starting zone.

If a stop signal is active, the material to be conveyed is transported up to the zone sensor. The material to be conveyed will be transported further once the stop signal is reset, provided that the downstream zone is free.

If the material to be conveyed is removed from a stopped zone and the stop signal is reset, the RollerDrive starts and the conveying process continues once timer 4 elapses. If the material to be conveyed is placed in the zone sensor before timer 4 elapses, the conveying process starts immediately. As long as the material to be conveyed is stopped, the downstream zone continues to receive a "free" signal, not an "occupied" signal.

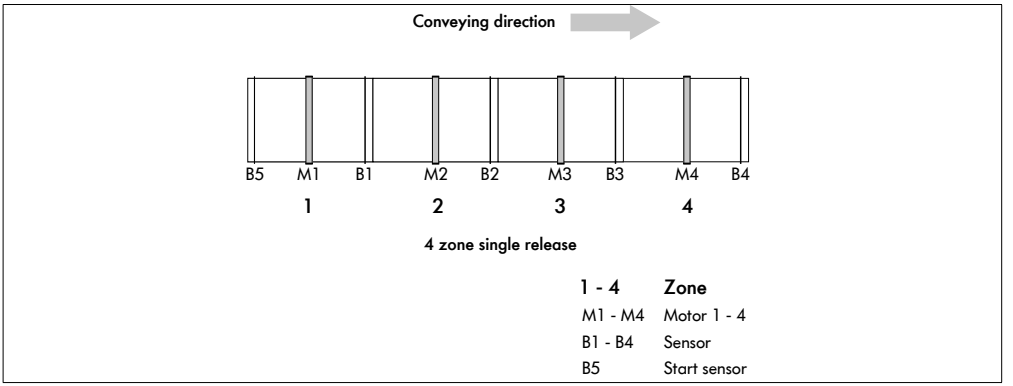
After passing the zone sensor, the material to be conveyed must reach the next zone sensor within the timer 2 time. The upstream zone is stopped while timer 2 elapses. Once timer 2 has elapsed, the zone is considered to be free and the upstream zone can convey in new material, as it is assumed that the material to be conveyed has been removed.

If material to be conveyed blocks the zone sensor, the RollerDrive stops once timer 2 elapses (internal monitoring of the material to be conveyed). After a break of the same duration as timer 2, the RollerDrive starts up again. This process repeats until the material to be conveyed has been removed from the zone sensor. As long as the zone sensor is blocked, an "occupied" signal is sent to the upstream zone.

Once the material to be conveyed has left the zone sensor, the RollerDrive continues running for as long as the time set in timer 3 (RunOutDelay).

10.1 ZPA single release

For single release, release takes place in individual zones ("ZPA single release 1 zone" to "ZPA single release 4 zone"). Free RollerDrive connections can be used as slave motors in line with the table (IPI motor states).



Timers

ID	Description	Factory setting [ms]
T1	Connection monitoring	200
T2	Internal monitoring of the material to be conveyed	4000
T3	RollerDrive overrun	5000
T4	Error reset	1000

The "Timer 1 – connection monitoring" parameter should not be changed.
The corresponding process images are provided below in addition to the control program explanations.

PLC references in line with "Universal full" process image

IPI – sensors 1–5

ID	1 zone	2 zones	3 zones	4 zones	PLC reference (read)	
					Byte	Bit
B1	Zone 1 sensor	Zone 1 sensor	Zone 1 sensor	Zone 1 sensor	I: 0	0
B2	Not in use	Zone 2 sensor	Zone 2 sensor	Zone 2 sensor	I: 0	1
B3	Not in use	Not in use	Zone 3 sensor	Zone 3 sensor	I: 0	2
B4	Not in use	Not in use	Not in use	Zone 4 sensor	I: 0	3
B5	Start sensor zone 1	Start sensor zone 1	Start sensor zone 1	Start sensor zone 1	I: 0	4

For settings of polarity and function of the connected sensors see „Inputs and outputs“ on page 25.

IPI – motor states (speed 1–4)

ID	1 zone	2 zones	3 zones	4 zones	PLC reference (read)
					Byte
M1	Zone 1 motor	Zone 1 motor	Zone 1 motor	Zone 1 motor	I: 3
M2	Zone 1 slave	Zone 2 motor	Zone 2 motor	Zone 2 motor	I: 4
M3	Zone 1 slave	Zone 1 slave	Zone 3 motor	Zone 3 motor	I: 5
M4	Zone 1 slave	Zone 2 slave	Not in use	Zone 4 motor	I: 6

OPI – control input overwrite (control input 1–4)

ID	1 zone	2 zones	3 zones	4 zones	PLC reference (write)	
					Byte	Bit
CI1	Stop zone 1	Stop zone 1	Stop zone 1	Stop zone 1	Q: 5	0
CI2	Not in use	Stop zone 2	Stop zone 2	Stop zone 2	Q: 5	1
CI3	Not in use	Not in use	Stop zone 3	Stop zone 3	Q: 5	2
CI4	Not in use	Not in use	Not in use	Stop zone 4	Q: 5	3

IPI – control outputs (control output 1–4)

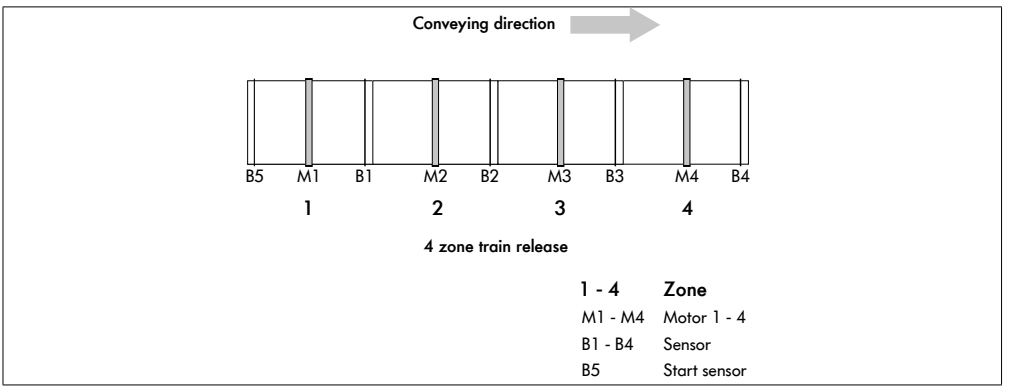
ID	1 zone	2 zones	3 zones	4 zones	PLC reference (read)	
					Byte	Bit
CO1	Zone 1 occupied	Zone 1 occupied	Zone 1 occupied	Zone 1 occupied	I: 28	0
CO2	Not in use	Zone 2 occupied	Zone 2 occupied	Zone 2 occupied	I: 28	1
CO3	Not in use	Not in use	Zone 3 occupied	Zone 3 occupied	I: 28	2
CO4	Not in use	Not in use	Not in use	Zone 4 occupied	I: 28	3

10.2 ZPA train release

For train release ("ZPA train release 1 zone" to "ZPA train release 4 zone"), release always takes place in blocks so that all associated zones become free at nearly the same time.

Following a system restart or an error, the system is initialised in "single release" mode. It then switches to train release mode.

Free RollerDrive connections can be used as slave motors in line with the "IPI – motor states" table.



Timers

ID	Description	Factory setting [ms]
T1	Train release delay	100
T2	Internal monitoring of the material to be conveyed	4000
T3	RollerDrive overrun	5000
T4	Error reset	1000

The timer 1 parameter affects the delayed start of the RollerDrive for train release.

PLC references in line with "Universal full" process image

IPI – sensors 1–5

ID	1 zone	2 zones	3 zones	4 zones	PLC reference (read)	
					Byte	Bit
B1	Zone 1 sensor	Zone 1 sensor	Zone 1 sensor	Zone 1 sensor	I: 0	0
B2	Not in use	Zone 2 sensor	Zone 2 sensor	Zone 2 sensor	I: 0	1
B3	Not in use	Not in use	Zone 3 sensor	Zone 3 sensor	I: 0	2
B4	Not in use	Not in use	Not in use	Zone 4 sensor	I: 0	3
B5	Start sensor zone 1	Start sensor zone 1	Start sensor zone 1	Start sensor zone 1	I: 0	4

For settings of polarity and function of the connected sensors see „Inputs and outputs“ on page 25.

IPI – motor states (speed 1–4)

ID	1 zone	2 zones	3 zones	4 zones	PLC reference (read)
					Byte
M1	Zone 1 motor	Zone 1 motor	Zone 1 motor	Zone 1 motor	I: 3
M2	Zone 1 slave	Zone 2 motor	Zone 2 motor	Zone 2 motor	I: 4
M3	Zone 1 slave	Zone 1 slave	Zone 3 motor	Zone 3 motor	I: 5
M4	Zone 1 slave	Zone 2 slave	Not in use	Zone 4 motor	I: 6

OPI – control input overwrite (control input 1–4)

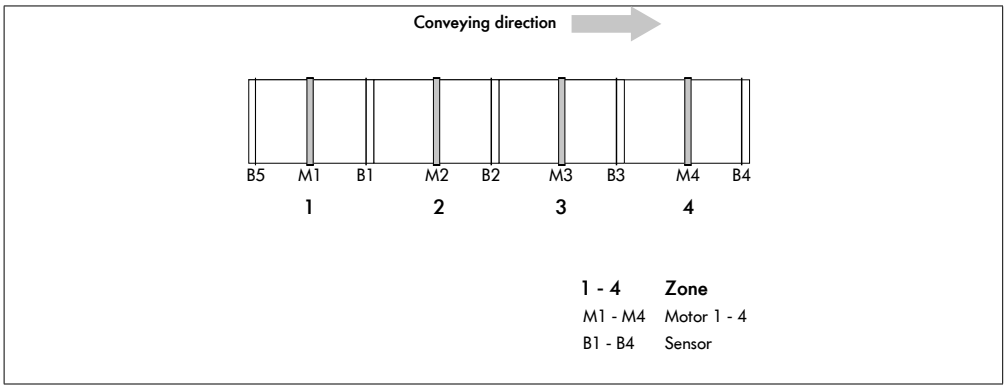
ID	1 zone	2 zones	3 zones	4 zones	PLC reference (write)	
					Byte	Bit
CI1	Stop zone 1	Stop zone 1	Stop zone 1	Stop zone 1	Q: 5	0
CI2	Not in use	Stop zone 2	Stop zone 2	Stop zone 2	Q: 5	1
CI3	Not in use	Not in use	Stop zone 3	Stop zone 3	Q: 5	2
CI4	Not in use	Not in use	Not in use	Stop zone 4	Q: 5	3

IPI – control outputs (control output 1–4)

ID	1 zone	2 zones	3 zones	4 zones	PLC reference (read)	
					Byte	Bit
CO1	Zone 1 occupied	Zone 1 occupied	Zone 1 occupied	Zone 1 occupied	I: 28	0
CO2	Not in use	Zone 2 occupied	Zone 2 occupied	Zone 2 occupied	I: 28	1
CO3	Not in use	Not in use	Zone 3 occupied	Zone 3 occupied	I: 28	2
CO4	Not in use	Not in use	Not in use	Zone 4 occupied	I: 28	3

Handover (handshake signals)

The information required for transporting material to be conveyed is exchanged between the MultiControl and the external control system via handshake signals.



Out up	=	Signal from MultiControl	First zone is free
In up	=	Signal to MultiControl	Transfer material to be conveyed into first zone
Out down	=	Signal from MultiControl	Last zone is occupied
In down	=	Signal to MultiControl	Transfer material to be conveyed out of last zone

IPI – handshake signals

ID	Zone	Digital I/O setting	PLC reference (read)	
			Byte	Bit
Out up	Signal: First zone free	Handshake out up	I: 29	4
Out down	Signal: Last zone occupied	Handshake out down	I: 29	5

OPI – handshake signals

ID	Zone	Digital I/O setting	PLC reference (write)	
			Byte	Bit
In up	Signal: Convey into first zone	Handshake in up	Q: 8	0
In down	Signal: Convey out of last zone	Handshake in down	Q: 8	1

The signal to transport the material to be conveyed out of a zone must be active until the material to be conveyed no longer occupies the zone sensor. If the signal is deactivated sooner, the material to be conveyed remains in the occupied zone sensor.

If the signal to convey material out is set again in train release mode, the system initialises in single release mode. It then switches to train release mode.

A pulse is sufficient for the signal to convey in. The material to be conveyed is conveyed up to the zone sensor. The pulse must be at least 100 ms long.

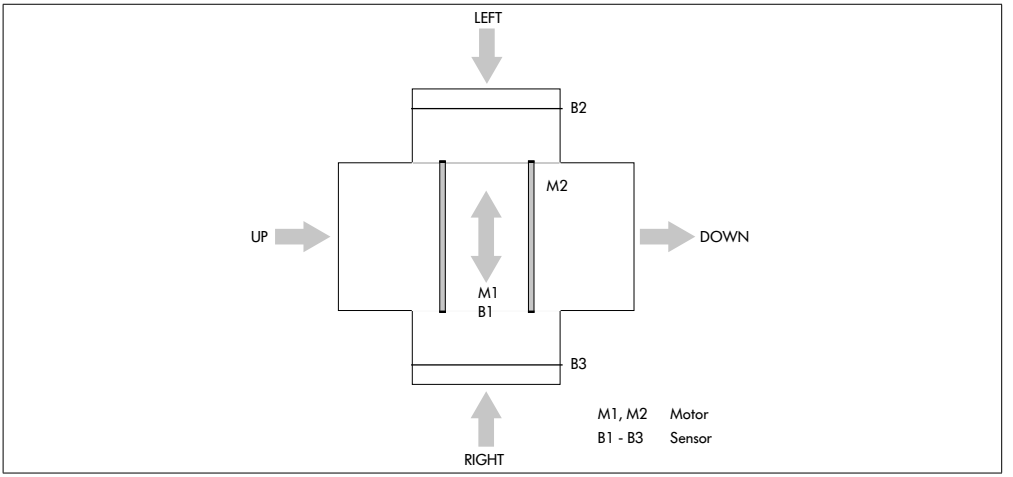
10.3 ZPA Transfer in

The "ZPA Transfer in" program can be used to introduce material to be conveyed into the conveyor line from up to two additional feeders.

The material to be conveyed is conveyed in the selected direction from upstream left or right to downstream. The signals for the choice of direction are set by a PLC.

If a feeder is free in the "Automatic merge" setting, the operation of the remaining feeders automatically alternates to prevent material accumulating (see "Merge prioritisation" table).

Set motor 1 to "counterclockwise" in "Motor settings".



Timers

ID	Description	Factory setting [ms]
T1	Connection monitoring	100
T2	Not in use	2000
T3	Error reset	1000
T4	Internal monitoring of the material to be conveyed	4000

The timer 1 parameter should not be changed.

PLC references in line with "Universal full" process image

IPI – sensors 1–4

ID	Description	MultiControl connection	Settings	PLC reference (read)	
				Byte	Bit
B1	Vertical zero position sensor	Sensor 1	PNP/positive	I: 0	0
B2	Left run-in sensor (gap check)	Sensor 2	PNP/positive	I: 0	1
B3	Right run-in sensor (gap check)	Sensor 3	PNP/positive	I: 0	2
B4	Not in use	Not in use		Not in use	

Transfer variant settings

Transfer variant	MultiControl connection	Settings
Up/left/right to down	-	-
Up/left to down	Sensor 3 (B3)	PNP/negative*
Up/right to down	Sensor 2 (B2)	PNP/negative*
Left to down	Sensor 3 (B3)	PNP/negative*
Right to down	Sensor 2 (B2)	PNP/negative*
Left/right to down	-	-

* Set in web server or via SDOs, no sensor connected

IPI – motor states (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (read)
				Byte
M1	Hoist drive motor	-	Motor1	I: 3
M2	Belt drive motor	-	Motor 2	I: 4
M3	Transfer roller motor	RD 3	-	I: 5
M4	Transfer roller motor	RD 4	-	I: 6

OPI – control input overwrite (control input 1–4)

ID	Description	PLC reference (write)	
		Byte	Bit
CI 1	Selected direction 1	Q: 5	0
CI 2	Selected direction 2	Q: 5	1
CI 3	Not in use	Not in use	
CI 4	Not in use	Not in use	

Choice of direction

CI 1	CI 2	Description
0	0	From up to down
1	0	From left to down
0	1	From right to down
1	1	Automatic merge

Merge prioritisation

Choice of direction	Up	Left	Right	Decision
From up to down	Free	Free	Free	No transport
	Free	Free	Occupied	No transport
	Free	Occupied	Free	No transport
	Free	Occupied	Occupied	No transport
	Occupied	Free	Free	From up to down
	Occupied	Free	Occupied	From up to down
	Occupied	Occupied	Free	From up to down
	Occupied	Occupied	Occupied	From up to down
From left to down	Free	Free	Free	No transport
	Free	Free	Occupied	No transport
	Free	Occupied	Free	From left to down
	Free	Occupied	Occupied	From left to down
	Occupied	Free	Free	No transport
	Occupied	Free	Occupied	No transport
	Occupied	Occupied	Free	From left to down
	Occupied	Occupied	Occupied	From left to down
From right to down	Free	Free	Free	No transport
	Free	Free	Occupied	From right to down
	Free	Occupied	Free	No transport
	Free	Occupied	Occupied	From right to down
	Occupied	Free	Free	No transport
	Occupied	Free	Occupied	From right to down
	Occupied	Occupied	Free	No transport
	Occupied	Occupied	Occupied	From right to down

Choice of direction	Up	Left	Right	Decision
Automatic merge	Free	Free	Free	No transport
	Free	Free	Occupied	From right to down
	Free	Occupied	Free	From left to down
	Free	Occupied	Occupied	From left/right to down in turn
	Occupied	Free	Free	From up to down
	Occupied	Free	Occupied	From up/right to down in turn
	Occupied	Occupied	Free	From up/left to down in turn
	Occupied	Occupied	Occupied	From up/left/right to down in turn

Transfer (handshake signals)

The information required for transporting material to be conveyed is exchanged between the MultiControl and an external control system via handshake signals.

Out left	=	Signal from MultiControl	Transfer is free
In left	=	Signal to MultiControl	Transfer material to be conveyed from left to Transfer
Out right	=	Signal from MultiControl	Transfer is free
In right	=	Signal to MultiControl	Transfer material to be conveyed from right to Transfer

IPI – handshake signals

ID	Zone	PLC reference (read)	
		Byte	Bit
Out left	Signal: Transfer free	I: 29	6
Out right	Signal: Transfer free	I: 29	7

OPI – handshake signals

ID	Zone	PLC reference (write)	
		Byte	Bit
In left	Signal: Convey in from left	Q: 8	2
In right	Signal: Convey in from right	Q: 8	3

10.4 ZPA Transfer out

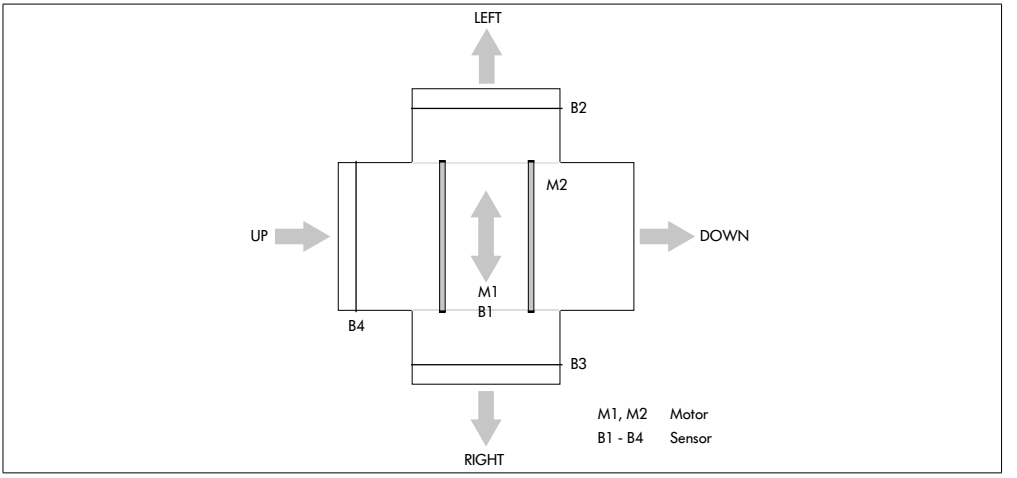
The "ZPA Transfer out" program can be used to distribute material to be conveyed to up to two additional diverters.

The decision where the material should be conveyed is requested when the material is conveyed in so the sensors need to be positioned such that the information can be provided in time. If this cannot be guaranteed within the required time frame, we recommend setting the stop function on the MultiControl of the upstream conveyor to prevent errors while reading and diverting.

If the downstream conveyor on the side is occupied, the Transfer belt speed is reduced. As soon as the downstream is free, the normal conveying speed is resumed.

If a diverter is occupied in the "Automatic distribution" setting, the operation of the remaining diverters automatically alternates to prevent material accumulating (see "Distribution prioritisation" table).

Set motor 1 to "counterclockwise" in "Motor settings".



Timers

ID	Description	Factory setting [ms]
T1	Connection monitoring	100
T2	Not in use	2000
T3	Error reset	1000
T4	Internal monitoring of the material to be conveyed	5000

The timer 1 parameter should not be changed.

PLC references in line with "Universal full" process image

IPI – sensors 1–4

ID	Description	MultiControl connection	Settings	PLC reference (read)	
				Byte	Bit
B1	Vertical zero position sensor	Sensor 1	PNP/positive	I: 0	0
B2	Left run-out sensor (gap check)	Sensor 2	PNP/positive	I: 0	1
B3	Right run-out sensor (gap check)	Sensor 3	PNP/positive	I: 0	2
B4	Rear edge query sensor	Sensor 4	PNP/positive	I: 0	3

Transfer variant settings

Transfer variant	MultiControl connection	Settings
Up to left/right/down	-	-
Up to left/down	Sensor 3 (B3)	PNP/negative*
Up to right/down	Sensor 2 (B2)	PNP/negative*
Up to left	Sensor 3 (B3)	PNP/negative*
Up to right	Sensor 2 (B2)	PNP/negative*
Up to left/right	-	-

* Set in web server or via SDOs, no sensor connected

IPI – motor states (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (read)
				Byte
M1	Hoist drive motor	-	Motor1	I: 3
M2	Belt drive motor	-	Motor 2	I: 4
M3	Transfer roller motor	RD 3	-	I: 5
M4	Transfer roller motor	RD 4	-	I: 6

OPI – control input overwrite (control input 1–4)

ID	Description	PLC reference (write)	
		Byte	Bit
CI 1	Selected direction 1	Q: 5	0
CI 2	Selected direction 2	Q: 5	1
CI 3	Not in use	Not in use	
CI 4	Not in use	Not in use	

Choice of direction

CI 1	CI 2	Description
0	0	From up to down
1	0	From up to left
0	1	From up to right
1	1	Automatic distribution

Distribution prioritisation

Choice of direction	Down	Left	Right	Decision
From up to down	Free	Free	Free	From up to down
	Free	Free	Occupied	From up to down
	Free	Occupied	Free	From up to down
	Free	Occupied	Occupied	From up to down
	Occupied	Free	Free	No transport
	Occupied	Free	Occupied	No transport
	Occupied	Occupied	Free	No transport
	Occupied	Occupied	Occupied	No transport
From up to left	Free	Free	Free	From up to left
	Free	Free	Occupied	From up to left
	Free	Occupied	Free	No transport
	Free	Occupied	Occupied	No transport
	Occupied	Free	Free	From up to left
	Occupied	Free	Occupied	From up to left
	Occupied	Occupied	Free	No transport
	Occupied	Occupied	Occupied	No transport
From up to right	Free	Free	Free	From up to right
	Free	Free	Occupied	No transport
	Free	Occupied	Free	From up to right
	Free	Occupied	Occupied	No transport
	Occupied	Free	Free	From up to right
	Occupied	Free	Occupied	No transport
	Occupied	Occupied	Free	From up to right
	Occupied	Occupied	Occupied	No transport

Choice of direction	Down	Left	Right	Decision
Automatic distribution	Free	Free	Free	To left/right/down in turn
	Free	Free	Occupied	To left/down in turn
	Free	Occupied	Free	To right/down in turn
	Free	Occupied	Occupied	From up to down
	Occupied	Free	Free	To left/right in turn
	Occupied	Free	Occupied	From up to left
	Occupied	Occupied	Free	From up to right
	Occupied	Occupied	Occupied	No transport

Transfer (handshake signals)

The information required for transporting material to be conveyed is exchanged between the MultiControl and an external control system via handshake signals.

Out left	=	Signal from MultiControl	Material to be conveyed to left is on Transfer
In left	=	Signal to MultiControl	Material to be conveyed should be transferred to left
Out right	=	Signal from MultiControl	Material to be conveyed to right is on Transfer
In right	=	Signal to MultiControl	Material to be conveyed should be transferred to right

IPI – handshake signals

ID	Zone	PLC reference (read)	
		Byte	Bit
Out left	Signal: Transfer occupied	I: 29	6
Out right	Signal: Transfer occupied	I: 29	7

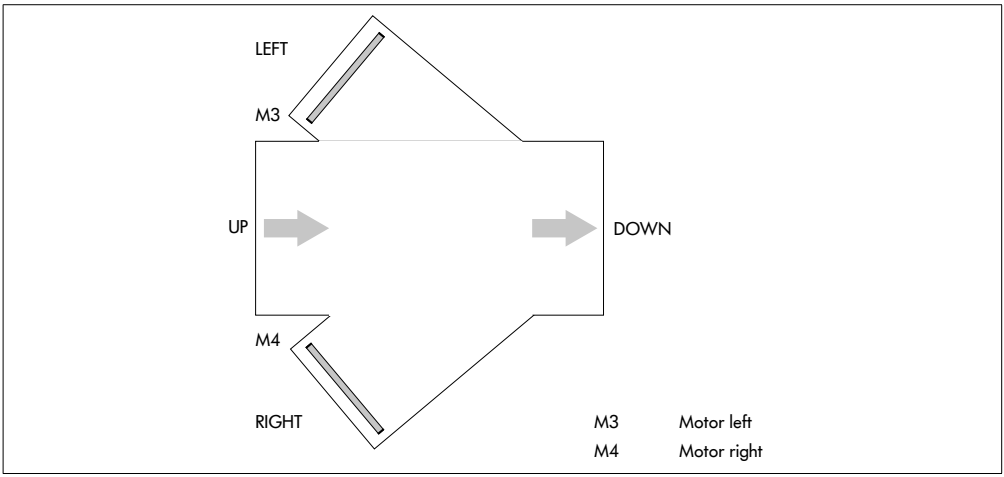
OPI – handshake signals

ID	Zone	PLC reference (write)	
		Byte	Bit
In left	Signal: Convey out to left	Q: 8	2
In right	Signal: Convey out to right	Q: 8	3

10.5 ZPA merge

The "ZPA merge" program can be used to introduce material to be conveyed into the conveyor line from up to two additional feeders.

If a feeder is free in the "Automatic merge" setting, the operation of the remaining feeders automatically alternates to prevent material accumulating (see "Merge prioritisation" table).



Timers

ID	Description	Factory setting [ms]
T1	Connection monitoring	100
T2	Not in use	2000
T3	Error reset	1000
T4	Internal monitoring of the material to be conveyed	4000

The timer 1 parameter should not be changed.

PLC references in line with "Universal full" process image

IPI – motor states (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (read)
				Byte
M1	Motor not in use	-	-	I: 3
M2	Motor not in use	-	-	I: 4
M3	Left run-in motor	RD 3	-	I: 5
M4	Right run-in motor	RD 4	-	I: 6

OPI – control input overwrite (control input 1–4)

ID	Description	PLC reference (write)	
		Byte	Bit
CI1	Selected direction 1	Q: 5	0
CI2	Selected direction 2	Q: 5	1
CI3	Reserved		
CI4	Reserved		

Choice of direction

CI 1	CI 2	Description
0	0	From up to down
1	0	From left to down
0	1	From right to down
1	1	Automatic merge

Merge prioritisation

Choice of direction	Up	Left	Right	Decision
From up to down	Free	Free	Free	No transport
	Free	Free	Occupied	No transport
	Free	Occupied	Free	No transport
	Free	Occupied	Occupied	No transport
	Occupied	Free	Free	From up to down
	Occupied	Free	Occupied	From up to down
	Occupied	Occupied	Free	From up to down
	Occupied	Occupied	Occupied	From up to down
From left to down	Free	Free	Free	No transport
	Free	Free	Occupied	No transport
	Free	Occupied	Free	From left to down
	Free	Occupied	Occupied	From left to down
	Occupied	Free	Free	No transport
	Occupied	Free	Occupied	No transport
	Occupied	Occupied	Free	From left to down
	Occupied	Occupied	Occupied	From left to down
From right to down	Free	Free	Free	No transport
	Free	Free	Occupied	From right to down
	Free	Occupied	Free	No transport
	Free	Occupied	Occupied	From right to down
	Occupied	Free	Free	No transport
	Occupied	Free	Occupied	From right to down
	Occupied	Occupied	Free	No transport
	Occupied	Occupied	Occupied	From right to down

Choice of direction	Up	Left	Right	Decision
Automatic merge	Free	Free	Free	No transport
	Free	Free	Occupied	From right to down
	Free	Occupied	Free	From left to down
	Free	Occupied	Occupied	From left/right to down in turn
	Occupied	Free	Free	From up to down
	Occupied	Free	Occupied	From up/right to down in turn
	Occupied	Occupied	Free	From up/left to down in turn
	Occupied	Occupied	Occupied	From up/left/right to down in turn

Transfer (handshake signals)

The information required for transporting material to be conveyed is exchanged between the MultiControl and an external control system via handshake signals.

Out left = Signal from MultiControl Merge is free

In left = Signal to MultiControl Convey in material to be conveyed from left

Out right = Signal from MultiControl Merge is free

In right = Signal to MultiControl Convey in material to be conveyed from right

IPI – handshake signals

ID	Zone	PLC reference (read)	
		Byte	Bit
Out left	Signal: Merge is free	I: 29	6
Out right	Signal: Merge is free	I: 29	7

OPI – handshake signals

ID	Zone	PLC reference (write)	
		Byte	Bit
In left	Signal: Convey in from left	Q: 8	2
In right	Signal: Convey in from right	Q: 8	3

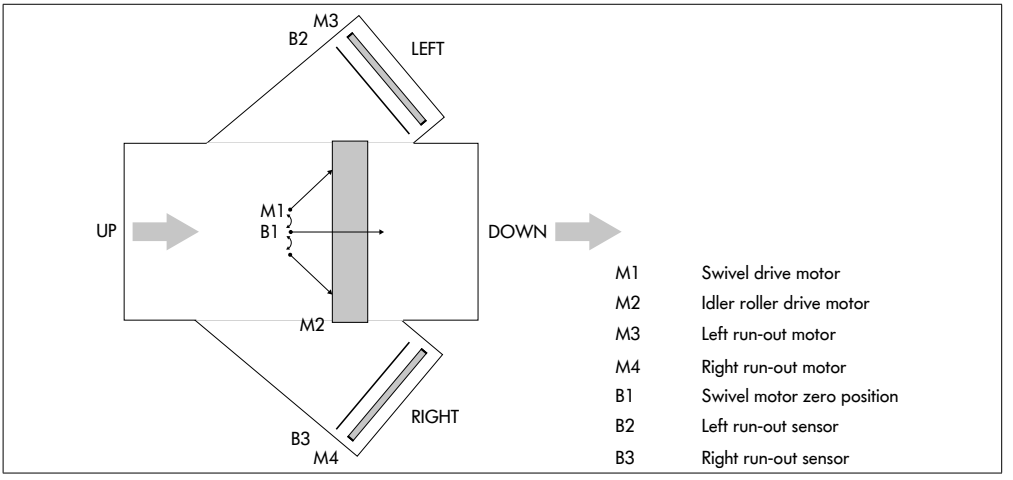
10.6 ZPA HPD (high-performance divert)

The "HPD" program can be used to distribute material to be conveyed to up to two additional diverters.

The decision where the material should be conveyed is requested when the material is conveyed in so the sensors need to be positioned such that the information can be provided in time. If this cannot be guaranteed within the required time frame, we recommend setting the stop function on the MultiControl of the upstream conveyor to prevent errors while reading and diverting.

If a diverter is occupied in the "Automatic distribution" setting, the operation of the remaining diverters automatically alternates to prevent material accumulating (see "Distribution prioritisation" table).

The HPD can move from +45° to -45°.



Timers

ID	Description	Factory setting [ms]
T1	Connection monitoring	100
T2	Internal monitoring of the material to be conveyed	19000
T3	Error reset	1000
T4	Step pulse	100

The timer 1 to timer 4 parameters should not be changed.

PLC references in line with "Universal full" process image

IPI – sensors 1–4

ID	Description	MultiControl connection	Settings	PLC reference (read)	
				Byte	Bit
B1	Swivel motor zero position	Sensor 1	PNP/negative	I: 0	0
B2	Left run-out sensor	Sensor 2	PNP/positive	I: 0	1
B3	Right run-out sensor	Sensor 3	PNP/positive	I: 0	2
B4	Not in use	Not in use		Not in use	

HPD variant settings

HPD variant	MultiControl connection	Settings
Up to left/right/down	-	-
Up to left/down	Sensor 3 (B3)	PNP/negative*
Up to right/down	Sensor 2 (B2)	PNP/negative*
Up to left	Sensor 3 (B3)	PNP/negative*
Up to right	Sensor 2 (B2)	PNP/negative*
Up to left/right	-	-

* Set in web server or via SDOs, no sensor connected

IPI – motor states (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (read)
				Byte
M1	Swivel drive motor	-	Motor1	I: 3
M2	Idler roller drive motor	-	Motor 2	I: 4
M3	Left run-out motor	RD 3		I: 5
M4	Right run-out motor	RD 4		I: 6

OPI – control input overwrite (control input 1–4)

ID	Description	PLC reference (write)	
		Byte	Bit
CI1	Selected direction 1	Q: 5	0
CI2	Selected direction 2	Q: 5	1
CI3	Selected direction 3	Q: 5	2
CI4	Selected direction 4	Q: 5	3

Choice of direction

CI 1	CI 2	CI 3	CI 4	Description
0	0	X	X	From up to down
1	0	0	X	From up to left 45°
0	1	X	0	From up to right 45°
1	0	1	X	From up to left 30°
0	1	X	1	To right 30°
1	1	0	0	Automatic distribution right 45°/left 45°
1	1	1	1	Automatic distribution right 30°/left 30°
1	1	0	1	Automatic distribution right 30°/left 45°
1	1	1	0	Automatic distribution right 45°/left 30°

Distribution prioritisation

Choice of direction	Down	Left	Right	Decision
From up to down	Free	Free	Free	From up to down
	Free	Free	Occupied	From up to down
	Free	Occupied	Free	From up to down
	Free	Occupied	Occupied	From up to down
	Occupied	Free	Free	No transport
	Occupied	Free	Occupied	No transport
	Occupied	Occupied	Free	No transport
	Occupied	Occupied	Occupied	No transport
From up to left	Free	Free	Free	From up to left
	Free	Free	Occupied	From up to left
	Free	Occupied	Free	No transport
	Free	Occupied	Occupied	No transport
	Occupied	Free	Free	From up to left
	Occupied	Free	Occupied	From up to left
	Occupied	Occupied	Free	No transport
	Occupied	Occupied	Occupied	No transport
From up to right	Free	Free	Free	From up to right
	Free	Free	Occupied	No transport
	Free	Occupied	Free	From up to right
	Free	Occupied	Occupied	No transport
	Occupied	Free	Free	From up to right
	Occupied	Free	Occupied	No transport
	Occupied	Occupied	Free	From up to right
	Occupied	Occupied	Occupied	No transport

Choice of direction	Down	Left	Right	Decision
Automatic distribution	Free	Free	Free	To left/right/down in turn
	Free	Free	Occupied	To left/down in turn
	Free	Occupied	Free	To right/down in turn
	Free	Occupied	Occupied	From up to down
	Occupied	Free	Free	To left/right in turn
	Occupied	Free	Occupied	From up to left
	Occupied	Occupied	Free	From up to right
	Occupied	Occupied	Occupied	No transport

Transfer (handshake signals)

The information required for transporting material to be conveyed is exchanged between the MultiControl and an external control system via handshake signals.

Out left	=	Signal from MultiControl	Material to be conveyed to left is available
In left	=	Signal to MultiControl	Material to be conveyed should be transferred to left
Out right	=	Signal from MultiControl	Material to be conveyed to right is available
In right	=	Signal to MultiControl	Material to be conveyed should be transferred to right

IPI – handshake signals

ID	Zone	PLC reference (read)	
		Byte	Bit
Out left	Signal: HPD occupied	I: 29	6
Out right	Signal: HPD occupied	I: 29	7

OPI – handshake signals

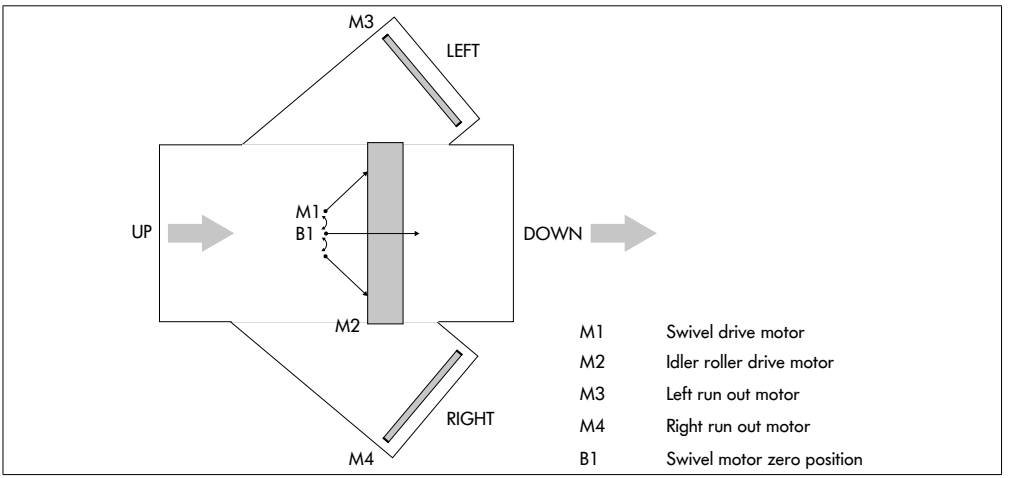
ID	Zone	PLC reference (write)	
		Byte	Bit
In left	Signal: Convey out to left	Q: 8	2
In right	Signal: Convey out to right	Q: 8	3

10.7 Semi-automatic programs

Semi-automatic programs make it possible to control the transfer drives with digital signals.

10.8 HPD semi automatic

The HPD can move from +90° to -90°.



Timers

ID	Description	Factory setting [ms]
T1	0 position (homing)	1000
T2	Internal monitoring of the material to be conveyed	19000
T3	Error reset	5000
T4	Step pulse	100

Timer 1: Homing delay – start homing once T1 is inactive

Timer 2: Homing time out – sensor 1 not found

Timer 3: Error recovery – program restart after time out

Timer 4: Step (pulse) – carries out all T4 for one step during homing

The timer 1 to timer 4 parameters should not be changed.

PLC references in line with "Universal full" process image

IPI – sensors 1–4

ID	Description	MultiControl connection	Settings	PLC reference (read)	
				Byte	Bit
B1	Swivel motor zero position	Sensor 1	PNP/negative	I: 0	0

IPI – motor states (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (read)
				Byte
M1	Swivel drive motor	-	Motor1	I: 3
M2	Idler roller drive motor	-	Motor 2	I: 4
M3	Left run-out motor (optional)	RD 3		I: 5
M4	Right run-out motor (optional)	RD 4		I: 6

OPI – control input overwrite (control input 1–4)

ID	Description		PLC reference (write)	
	True	False	Byte	Bit
CI1	Pivot to left	Pivot to right	Q: 5	0
CI2	Angle setting (see table)	Angle setting (see table)	Q: 5	1
CI3	Angle setting (see table)	Angle setting (see table)	Q: 5	2
CI4	Start M2, M3, M4	Stop M2, M3, M4	Q: 5	3

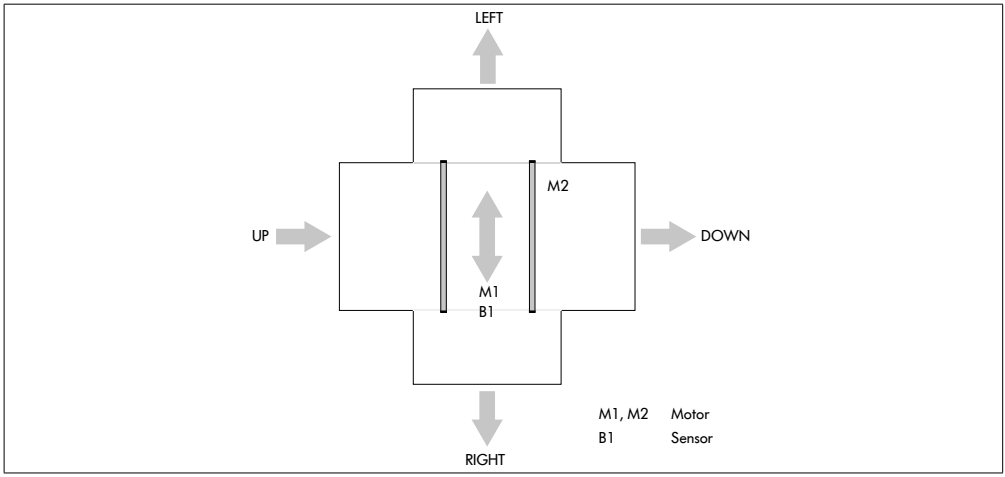
Angle setting selection

CI 1	CI 2	CI 3	Angle setting
0	0	0	0°
1	0	1	-30° (left)
1	1	0	-45° (left)
1	1	1	-90° (left)
0	0	1	+30° (right)
0	1	0	+45° (right)
0	1	1	+90° (right)
1	0	0	Homing

IPI – control outputs (control output 1–4)

ID	HPD	PLC reference (read)	
		Byte	Bit
CO 1	Homing	I: 28	0
CO 2	Not in use	I: 28	1
CO 3	Ready for operation	I: 28	2
CO 4	Not ready for operation	I: 28	3

10.9 Transfer semi automatic



Set motor 1 to "counterclockwise" in "Motor settings".

Timers

ID	Description	Factory setting [ms]
T1	Error reset (program restart after time out)	2000
T2	Not in use	2000
T3	Not in use	2000
T4	Monitoring time (movement not complete within allocated time, vertical zero position not reached)	2000

PLC references in line with "Universal full" process image

IPI – sensors 1–4

ID	Description	MultiControl connection	Settings	PLC reference (read)	
				Byte	Bit
B1	Vertical zero position sensor	Sensor 1	PNP/positive	I: 0	0

IPI – motor states (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (read)
				Byte
M1	Hoist drive motor	-	Motor1	I: 3
M2	Belt drive motor	-	Motor 2	I: 4
M3	Optional	RD 3	-	I: 5
M4	Optional	RD 4	-	I: 6

OPI – control input overwrite (control input 1–4)

ID			PLC reference (write)	
	True	False	Byte	Bit
CI1	M1 enable stroke	M1 stroke off	Q: 5	0
CI2	M1 stroke top	M1 stroke bottom	Q: 5	1
CI3	M2 belt drive to right*	-	Q: 5	2
CI4	M2 belt drive to left*	-	Q: 5	3

* Optional Motors M3 and M4 start in the same time and direction as M2

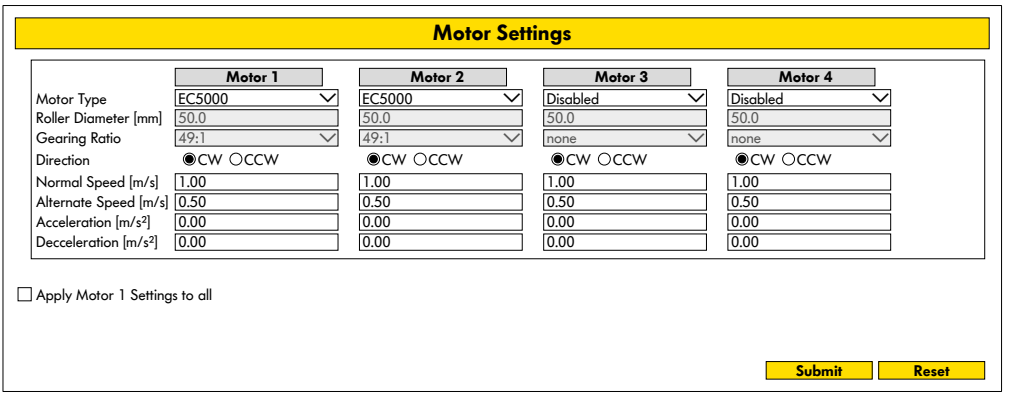
IPI – control outputs (control output 1–4)

ID			PLC reference (read)	
	True	False	Byte	Bit
CO 1	Stop	Standard operation	I: 28	0
CO 2	Stroke top	Stroke bottom	I: 28	1
CO 3	Ready for operation	Not in use	I: 28	2
CO 4	Not ready for operation	Not in use	I: 28	3

10.10 I/O device

In the "I/O device" program, the motors and inputs/outputs are controlled by a program created in the higher-level control system.

The motor speed is set via positive or negative target percentages in corresponding output bytes. The "Move" command is used in the higher-level control system for this purpose. The target percentage relates back to the "Normal speed" value set on the web server.



Deactivate unused motors to avoid error messages.

Set "Roller diameter", "Gearing ratio" and "Normal speed" according to the RollerDrive used.

The "Direction" parameter is used to adapt the rotational direction of the RollerDrive to the installation location (rotational direction as viewed from the cable end of the RollerDrive).

"Acceleration" and "Deceleration" adapt the start/stop behaviour of the RollerDrive.

The "Alternate speed" parameter is only used in the "I/O mode tiny" process image.

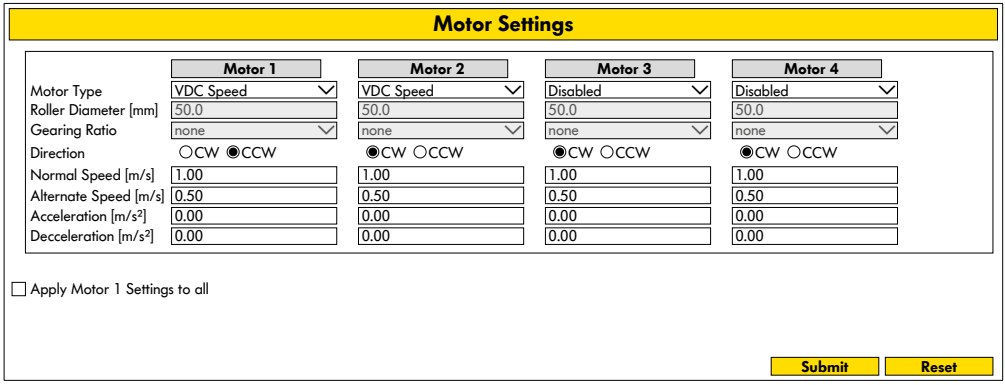
Press the "Submit" button to transfer the modified parameters to the MultiControl.

10.11 Specific parameters (Transfer and HPD only) in I/O device

The MultiControl makes it possible to use the Transfer or HPD as a fully PLC-controlled device. All functions must be implemented by the PLC. In this scenario, the MultiControl functions as a bus slave device.

Transfer

The MultiControl is the interface to the two motors in the Transfer.



PLC references in line with "Universal full" process image

IPI – sensors 1–4

ID	Description	MultiControl connection	Type	PLC reference (read)	
				Byte	Bit
B1	Hoist drive sensor	Sensor 1	PNP/positive	I: 0	0
	falling edge = top, rising edge = bottom				

OPI – motor (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (write)
				Byte
M1	Hoist drive motor	-	Motor1	Q: 1
M2	Belt drive motor	-	Motor 2	Q: 2

IPI – motor states (speed 1–4)

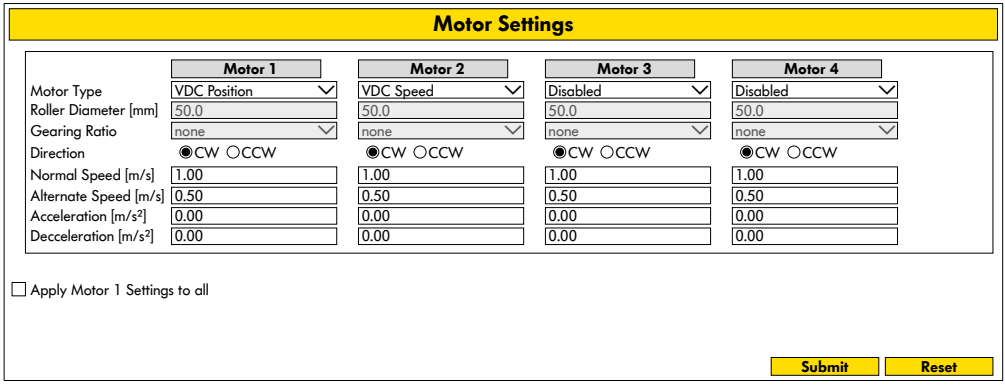
ID	Description	MultiControl connection	Interface box connection	PLC reference (read)
				Byte
M1	Hoist drive motor	-	Motor1	I: 3
M2	Belt drive motor	-	Motor 2	I: 4

Motor 1 is controlled by the "Motor speed 1" output byte:
Value 30 to 100 = motor turns at constant speed.
This causes the eccentric drive to turn and raise/lower the Transfer.

Motor 2 is controlled by the "Motor speed 2" output byte:
Value 0 to +100 = forward speed.
Value 0 to -100 = reverse speed.

HPD

The MultiControl is the interface to the two motors in the HPD.



IPI – sensors 1–4

ID	Description	MultiControl connection	Type	PLC reference (read)	
				Byte	Bit
B1	Swivel drive sensor	Sensor 1	PNP/negative	I: 0	0
	0° position				

OPI – motor (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (write)
				Byte
M1	Swivel drive motor	-	Motor1	Q: 1
M2	Idler roller drive motor	-	Motor 2	Q: 2

IPI – motor states (speed 1–4)

ID	Description	MultiControl connection	Interface box connection	PLC reference (read)
				Byte
M1	Swivel drive motor	-	Motor1	I: 3
M2	Idler roller drive motor	-	Motor 2	I: 4

Motor 1 is controlled via the "Motor speed 1" output byte:
Value 0 to 90 = motor angle in counterclockwise rotation.
Value 0 to -90 = motor angle in clockwise rotation.
The current position is shown in the input byte.

Motor 2 is controlled via the "Motor speed 2" output byte:
Value 0 to 100 = forward speed.
Value 0 to -100 = reverse speed.

Homing

When operating the HPD, the idler rollers may become twisted compared to the zero position. For this reason, the HPD has to be referenced from time to time and the position of the idler rollers corrected as needed (homing).

During this process, the "Motor speed 1" input byte shows the value 127. Once the zero position is reached, the value 0 is shown.

Value 127 = HPD resetting to zero position (homing straight, 0°)

Value 126 = Homing failed

For HPD, a homing process must be performed each time “Power RollerDrive” is switched on.

We recommend carrying out the initialisation regularly (e.g. every minute) when the HPD is at or near the zero position and there is no material flow for about two seconds, as the process takes less than 200 ms in this case. If the homing process is started in a different position, it may take several seconds.

A new referencing process can only be started every 30 seconds.

Homing may only be started when the HPD is between +80° and -80° as referencing cannot be performed correctly otherwise.

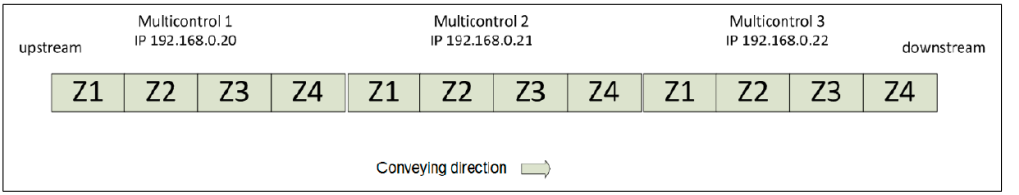
The logic voltage of the MultiControl must be at least 23 V.

What happens during the homing process?

1.	If sensor 1 = 0:	Motor turns counterclockwise until sensor 1 = 1 (finished).
2.	If sensor 1 = 1:	Motor turns clockwise until sensor 1 = 0
		Motor turns back counterclockwise until sensor 1 = 1 (finished).

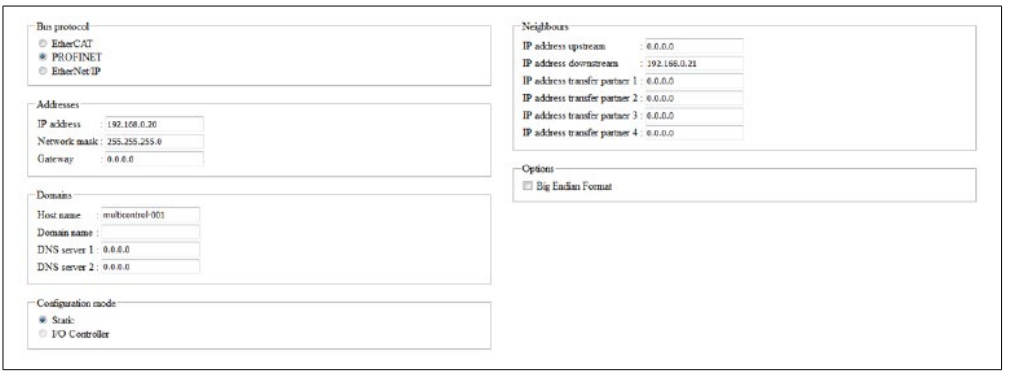
11 Application examples

11.1 Application example 1: Conveyor with three MultiControls



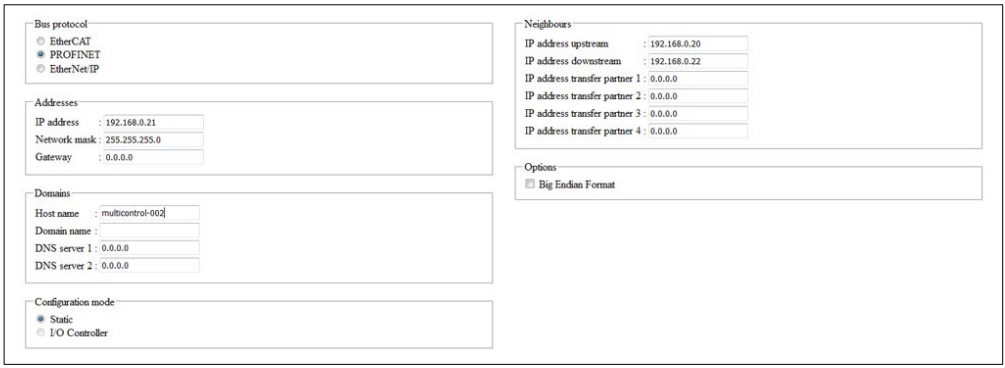
MultiControl 1

Control program selection: "ZPA single release 4 zone"



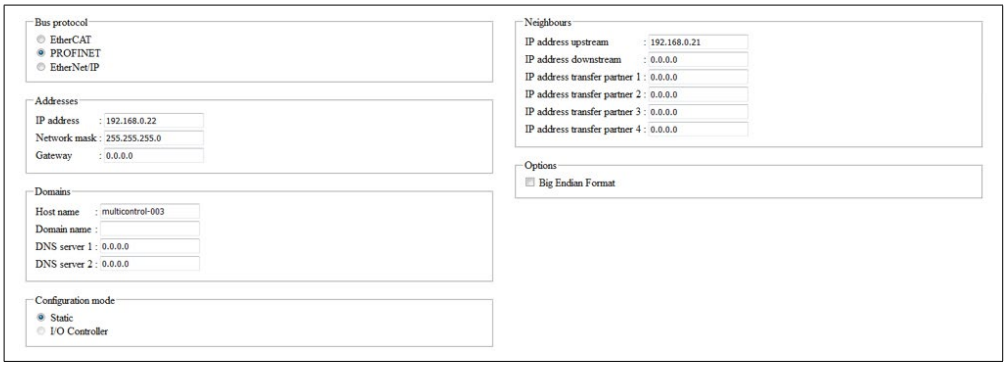
MultiControl 2

Control program selection: "ZPA single release 4 zone"

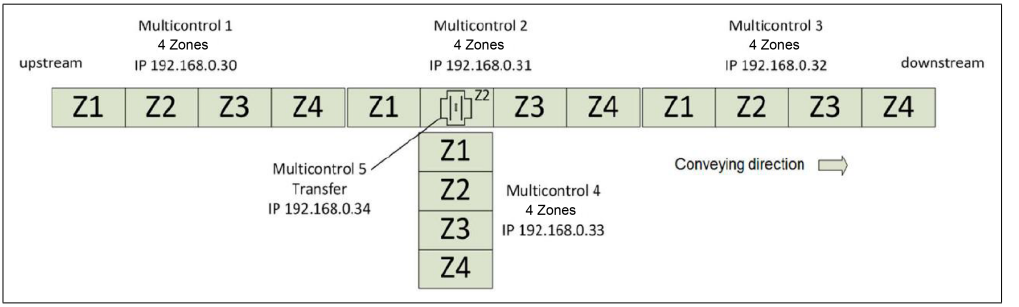


MultiControl 3

Control program selection: "ZPA single release 4 zone"

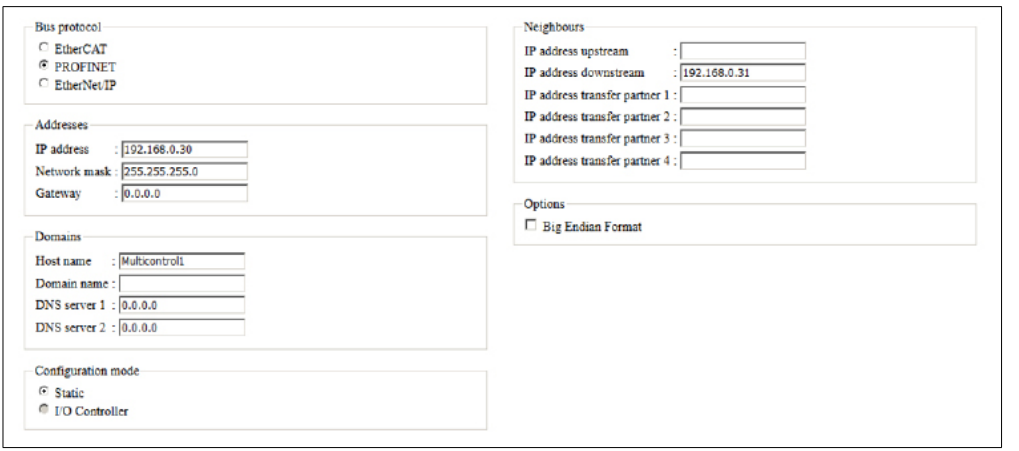


11.2 Application example 2: Conveyor and Transfer with five MultiControls



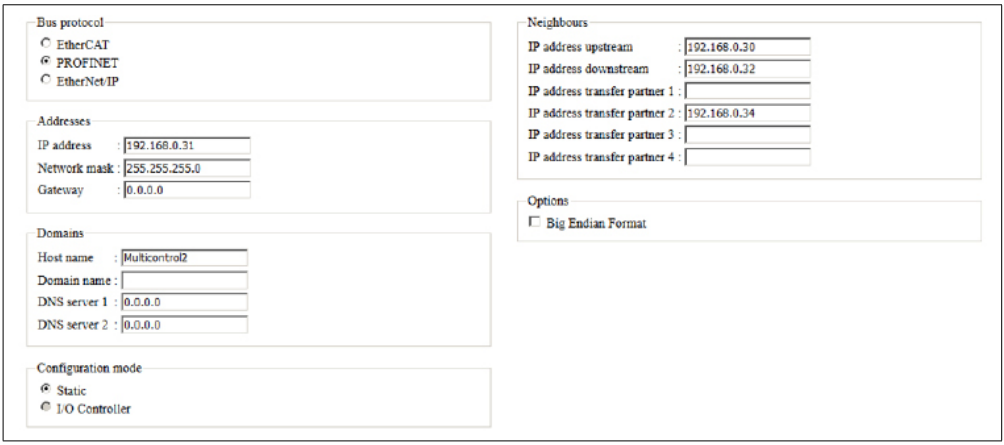
MultiControl 1

Control program selection: "ZPA single release 4 zone"



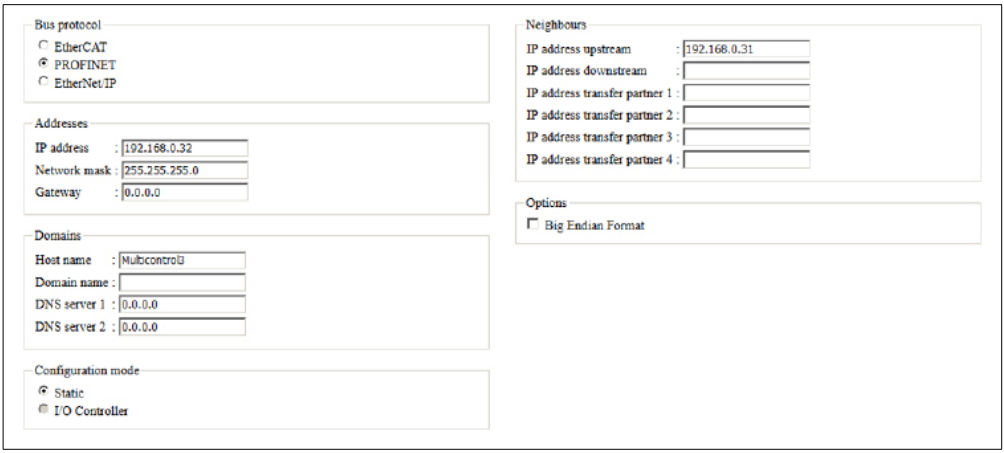
MultiControl 2

Control program selection: "ZPA single release 4 zone"



MultiControl 3

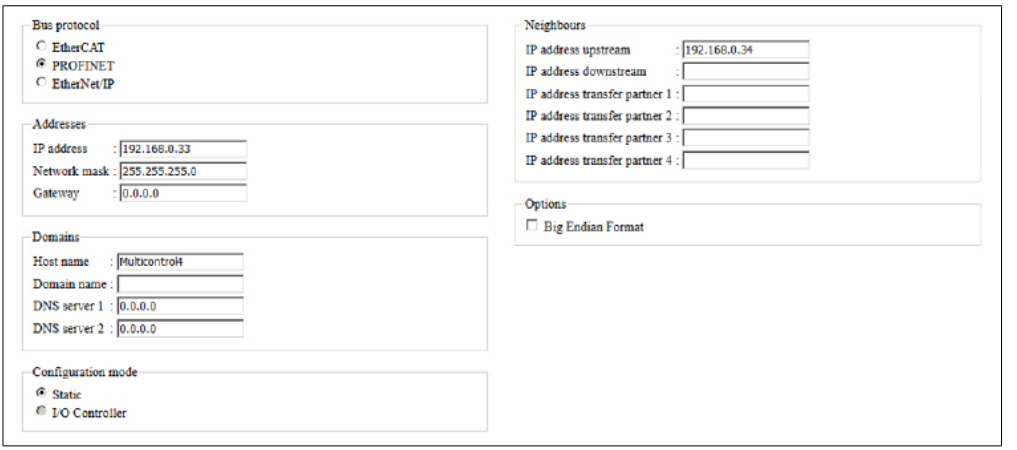
Control program selection: "ZPA single release 4 zone"



Application examples

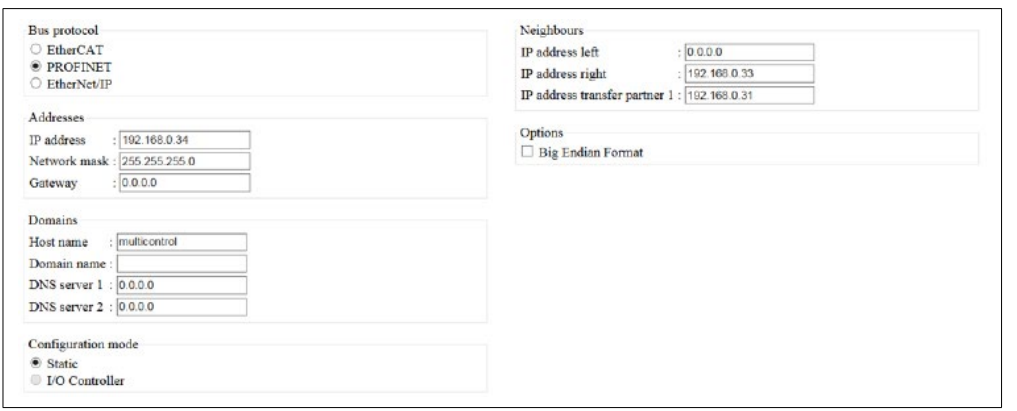
MultiControl 4

Control program selection: "ZPA single release 4 zone"

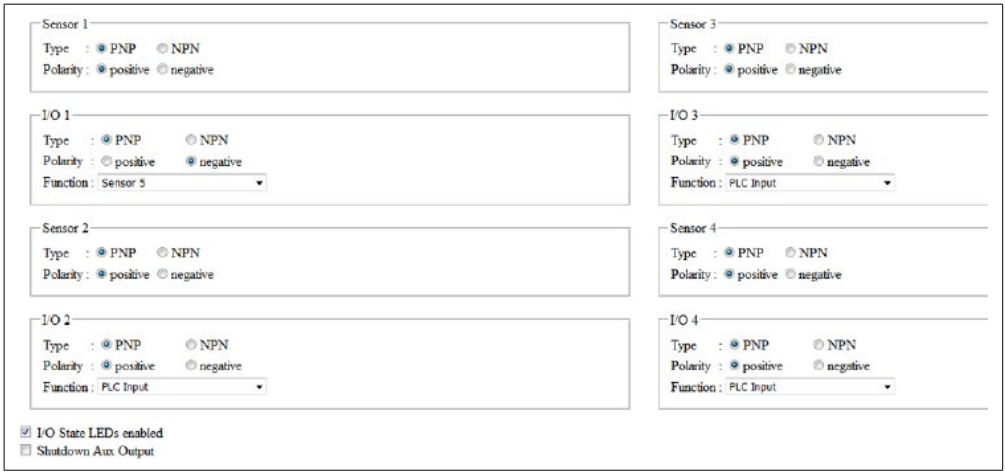


MultiControl 5

Control program selection: "ZPA Transfer In/Out"



11.3 Application example 3: Start sensor



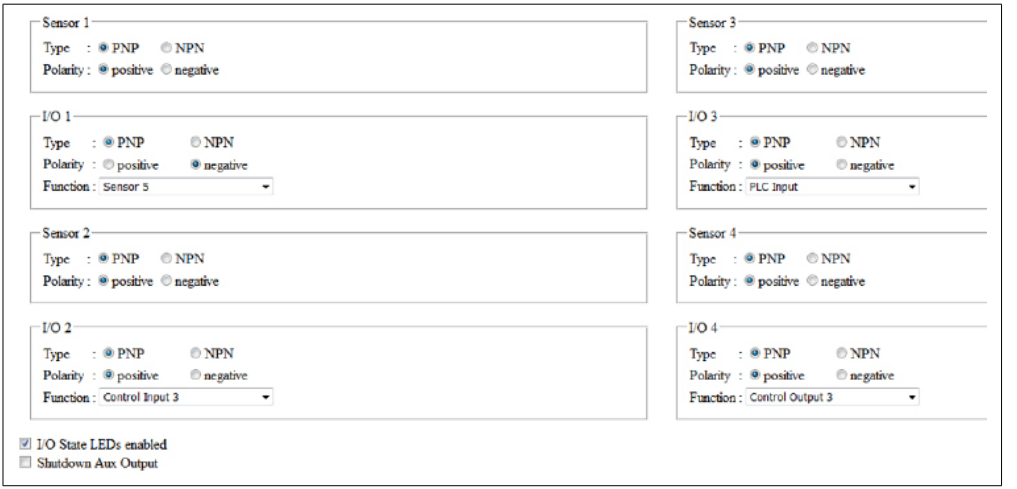
I/O 1

Function = sensor 5

Polarity = negative

The sensor connected to I/O 1 is now configured as the start sensor

11.4 Application example 4: Stopping zone 3



I/O 2

Function = control input 3

The third zone is stopped with a signal to I/O 2.

I/O 4

Function = control output 3

The "Zone sensor occupied" state of the third zone is output at I/O 4.

12 RollerDrive BI CANopen SDOs

Communication Specified Objects

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1000h	00h	Device Type	UINT32	ro			0x420192	x
1001h	00h	Error Register	UINT8	ro			0	TM
1002h	00h	Manufacturer Status Register	UINT32	ro			0	TM
1003h	00h	Pre-defined error field	UINT32	ro			0	x
1005h	00h	COB-ID SYNC Message	UINT32	rw			0x80	x
1006h	00h	Communication Cycle Period	UINT32	rw			0	x
1007h	00h	Synchronous Window Length	UINT32	rw			0	x
1008h	00h	Manufacturer Device Name	String	const			EC5000	x
1009h	00h	Manufacturer Hardware Version	String	const	4 Character	4 Character	1.00	x
100Ah	00h	Manufacturer Software Version	String	const	4 Character	4 Character	-	x
1010h	00h	Store Parameters - Array	UINT8	const			4	x
	01h	All Parameters Exept NodeID	UINT32	otw			„save" = 0x65766173	x
	02h	Communication Parameter (Com)	UINT32	rw			„save"	x
	03h	Application Parameters (App)	UINT32	rw			„save"	x
	04h	Manufacturer Parameters ASW (Man1)	UINT32	rw			„save"	x
	05h	Manufacturer Parameters SSW (Man2)	UINT32	rw			„save"	x

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1011h	00h	Restore Parameters - Array	UINT8	const			4	x
	01h	All Parameters Except NodeID	UINT32	rw			"load"	x
	02h	Communication Parameter	UINT32	rw			"load"	x
	03h	Application Parameter	UINT32	rw			"load"	x
	04h	Manufacturer Parameters ASW	UINT32	rw			"load"	x
	05h	Manufacturer Parameters SSW	UINT32	rw			"load"	x
1014h		COB-ID Emergency Message	UINT32	rw			0x80	x
1015h		Inhibit Time EMCY	UINT16	rw			0	x
1016h	00h	Consumer Heartbeat Time - Array	UINT8	const			1	x
	01h	Consumer Heartbeat Time [1] [ms]	UINT32	rw			0	x
1017h		Producer Heartbeat Time [ms]	UINT16	rw			0	x
1018h	00h	Identity Object (Vendor-ID)	UINT8	const			4	x
	01h	Vendor-ID	UINT32	ro			1019	x
	02h	Product Code	UINT32	ro			1	x
	03h	Revision Number	UINT32	ro			0x00010001	x
	04h	Serial Number	UINT32	ro			x	x
1019h	00h	Synchronous Counter Overflow Value	UINT8	rw			0	x
1029h	00h	Error Behavior	UINT8	const			0	x
	01h	Communication Error	UINT8	rw			0	x
	02h	Specific Error Class	UINT8	rw			0	x

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1200h	00h	1. SDO Server Parameter	UINT8	const			2	x
	01h	COB-ID Client -> Server	UINT16	const			600h + NodeID	x
	02h	COB-ID Server-> Client	UINT16	const			580h + NodeID	x
1400h	00h	1. RPDO Communication Parameter	UINT8	const			2	x
	01h	COB-ID	UINT32	ro	0x00000001	0xFFFFFFFF	200h + NodeID	x
	02h	Transmission Type	UINT8	rw			255	x
1401h	00h	2. RPDO Communication Parameter	UINT8	const			2	x
	01h	COB-ID	UINT32	ro	0x00000001	0xFFFFFFFF	300h + NodeID	x
	02h	Transmission Type	UINT8	rw			255	x
1402h	00h	3. RPDO Communication Parameter	UINT8	const			2	x
	01h	COB-ID	UINT32	ro	0x00000001	0xFFFFFFFF	400h + NodeID	x
	02h	Transmission Type	UINT8	rw			255	x
1403h	00h	4. RPDO Communication Parameter	UINT8	const			2	x
	01h	COB-ID	UINT32	ro	0x00000001	0xFFFFFFFF	500h + NodeID	x
	02h	Transmission Type	UINT8	rw			255	x

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1600h	00h	1st RPDO mapping parameter	UINT8	const			1	x
	01h	1st mapping object	UINT32	ro			6040 0010h	x
	02h	2nd mapping object	UINT32	ro			6060 0008h	x
	03h	3rd mapping object	UINT32	ro			6081 0020h	x
	04h	4th mapping object	UINT32	ro			0	x
	05h	5th mapping object	UINT32	ro			0	x
	06h	6th mapping object	UINT32	ro			0	x
	07h	7th mapping object	UINT32	ro			0	x
	08h	8th mapping object	UINT32	ro			0	x
1601h	00h	2nd RPDO mapping parameter	UINT8	const			2	x
	01h	1st mapping object	UINT32	ro			6040 0010h	x
	02h	2nd mapping object	UINT32	ro			607A 0020h	x
	03h	3rd mapping object	UINT32	ro			0	x
	04h	4th mapping object	UINT32	ro			0	x
	05h	5th mapping object	UINT32	ro			0	x
	06h	6th mapping object	UINT32	ro			0	x
	07h	7th mapping object	UINT32	ro			0	x
	08h	8th mapping object	UINT32	ro			0	x

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1602h	00h	3rd RPDO mapping parameter	UINT8	const			3	x
	01h	1st mapping object	UINT32	ro			6040 0010h	x
	02h	2nd mapping object	UINT32	ro			60FF 0020h	x
	03h	3rd mapping object	UINT32	ro			0	x
	04h	4th mapping object	UINT32	ro			0	x
	05h	5th mapping object	UINT32	ro			0	x
	06h	6th mapping object	UINT32	ro			0	x
	07h	7th mapping object	UINT32	ro			0	x
	08h	8th mapping object	UINT32	ro			0	x
1603h	00h	4th RPDO mapping parameter	UINT8	const			0	x
	01h	1st mapping object	UINT32	rw			0	x
	02h	2nd mapping object	UINT32	rw			0	x
	03h	3rd mapping object	UINT32	rw			0	x
	04h	4th mapping object	UINT32	rw			0	x
	05h	5th mapping object	UINT32	rw			0	x
	06h	6th mapping object	UINT32	rw			0	x
	07h	7th mapping object	UINT32	rw			0	x
	08h	8th mapping object	UINT32	rw			0	x

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1800h	00h	1. TPDO Communication Parameter	UINT8	const			6	x
	01h	COB-ID	UINT32	rw			0180h + NodeID	x
	02h	Transmission Type	UINT8	rw			255	x
	03h	Inhibit Time [100 µs]	UINT16	rw			1000	x
	04h	Reserved	UINT8	rw			0	x
	05h	Event Timer [ms]	UINT16	rw			2000 -> 0x07D0	x
	06h	SyncStartValue	UINT8	rw			0	x
1801h	00h	2. TPDO Communication Parameter	UINT8	const			6	x
	01h	COB-ID	UINT32	rw			0280h + NodeID	x
	02h	Transmission Type	UINT8	rw			255	x
	03h	Inhibit Time [100 µs]	UINT16	rw			1000	x
	04h	Reserved	UINT8	rw			0	x
	05h	Event Timer [ms]	UINT16	rw			2000 -> 0x07D0	x
	06h	SyncStartValue	UINT8	rw			0	x
1802h	00h	3. TPDO Communication Parameter	UINT8	const			6	x
	01h	COB-ID	UINT32	rw			0380h + NodeID	x
	02h	Transmission Type	UINT8	rw			1	x
	03h	Inhibit Time [100 µs]	UINT16	rw			1000 -> 0x03E8	x
	04h	Reserved	UINT8	rw			0	x
	05h	Event Timer [ms]	UINT16	rw			2000 -> 0x07D0	x
	06h	SyncStartValue	UINT8	rw			0	x

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1803h	00h	4th TPDO communication parameter	UINT8	const			6	x
	01h	COB ID	UINT32	rw			0480h + node ID	x
	02h	Transmission type	UINT8	rw			255	x
	03h	Inhibit Time [100 µs]	UINT16	rw			1000	x
	04h	Reserved	UINT8	rw			0	x
	05h	Event Timer [ms]	UINT16	rw			2000 -> 0x07D0	x
	06h	SyncStartValue	UINT8	rw			0	x
1A00h	00h	1st TPDO mapping parameter	UINT8	const			5	x
	01h	1st mapping object	UINT32	ro			6041 0010h	x
	02h	2nd mapping object	UINT32	ro			6061 0008h	x
	03h	3rd mapping object	UINT32	ro			1001 0008h	x
	04h	4th mapping object	UINT32	ro			2200 0610h	x
	05h	5th mapping object	UINT32	ro			6077 0010h	x
	06h	6th mapping object	UINT32	ro			0	x
	07h	7th mapping object	UINT32	ro			0	x
	08h	8th mapping object	UINT32	ro			0	x
1A01h	00h	2nd TPDO mapping parameter	UINT8	const			2	x
	01h	1st mapping object	UINT32	ro			6041 0010h	x
	02h	2nd mapping object	UINT32	ro			6064 0020h	x
	03h	3rd mapping object	UINT32	ro			0	x
	04h	4th mapping object	UINT32	ro			0	x
	05h	5th mapping object	UINT32	ro			0	x
	06h	6th mapping object	UINT32	ro			0	x
	07h	7th mapping object	UINT32	ro			0	x
	08h	8th mapping object	UINT32	ro			0	x

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1A02h	00h	3rd TPDO mapping parameter	UINT8	const			2	x
	01h	1st mapping object	UINT32	ro			6041 0010h	x
	02h	2nd mapping object	UINT32	ro			606C 0020h	x
	03h	3rd mapping object	UINT32	ro			0	x
	04h	4th mapping object	UINT32	ro			0	x
	05h	5th mapping object	UINT32	ro			0	x
	06h	6th mapping object	UINT32	ro			0	x
	07h	7th mapping object	UINT32	ro			0	x
	08h	8th mapping object	UINT32	ro			0	x
1A03h	00h	4th TPDO mapping parameter	UINT8	const			0	x
	01h	1st mapping object	UINT32	rw			0	x
	02h	2nd mapping object	UINT32	rw			0	x
	03h	3rd mapping object	UINT32	rw			0	x
	04h	4th mapping object	UINT32	rw			0	x
	05h	5th mapping object	UINT32	rw			0	x
	06h	6th mapping object	UINT32	rw			0	x
	07h	7th mapping object	UINT32	rw			0	x
	08h	8th mapping object	UINT32	rw			0	x

Bootloader objects

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
1F51h	00h	Switch bootloader mode		const				x
	01h	Restart	UINT8	rw	0	255		x
1F80h	00h	Nmt start-up	UINT32	rw				x

Value „1" in the object ID 1F51h 01h triggers a complete restart of this RollerDrive.

Monitoring

Object ID	Sub index	Name	Unit	Data type	Acc	Min.	Max.	Default	Mapp-able
2200h	00h	Monitoring values		UINT8	ro			9	x
	01h	Start stops		UINT32	ro			0	COS TM
	02h	Working hours	h	UINT32	ro			0	COS TM
	03h	Uptime (runtime)	h	UINT32	ro			0	COS TM
	04h	Absolute minimum temperature	°C	INT16	ro			0	COS TM
	05h	Absolute maximum temperature	°C	INT16	ro			0	COS TM
	06h	Actual temperature	°C	INT16	ro			0	COS TM
	07h	Number of quick stops		UINT16	ro			0	COS TM
	08h	Power average (mech.)	W/h	UINT8	ro			0	COS TM
	09h	Number of rotations		UINT32	ro			0	COS TM
2210h	00h	Lifetime traffic light		UINT8	ro	0=green; 1=yellow		0	COS TM
2211h	00h	Health traffic light		UINT8	ro			3	COS TM
	01h	Temperature		UINT8	ro	0 = green		0	COS TM
	02h	Power		UINT8	ro	1 = yellow		0	COS TM
	03h	Error quantity		UINT8	ro	2 = red		0	COS TM
2220h	00h	Analogue value output		UINT8	ro			1	COS TM
	01h	Analogue voltage [mV]		INT16	ro			0	COS TM

Runtime Objects

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mappable
4048h	00h	Nominal Power	UINT8	const			20/35/50	x

Thresholds

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mappable
4231h	00h	High temperature warning level	UINT8	const			2	x
	01h	Threshold	INT16	rw	50	115	95	x
	02h	Hysteresis	INT16	rw	2	50	2	x

Application parameters

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mappable
4645h	00h	Positioning Deceleration Ramp (ms/1000rpm)	UINT16	rw	0	65535	100	x
4650h	00h	Bus address	UINT8	const				x
	01h	Static node ID	UINT8	rw	0	127	127	x
	02h	Actual node ID	UINT8	ro	1	127	127	x
4651h	00h	Baud rate	UINT8	const	0		2	x
	01h	CAN	UINT16	rw	125	250	250	x
	02h	UART	UINT16	rw	19200	19200	19200	x
4FFEh	00h	Actual SDO server user	UINT8					x
4FFFh	00h	User login	UINT32					x

General objects

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
6007h	00h	Abort connection option code	INT16	rw			0	x
6040h	00h	Control word	UINT16	rw			0	RM
6041h	00h	Status word	UINT16	ro			0	TM
6060h	00h	Mode of operation	INT8	rw	0	1, 3, 6	3	RM
6061h	00h	Mode of operation display	INT8	ro			3	TM

Velocity mode

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
60FFh	00h	Target Velocity [mm/sec]	INT32	rw	-3000	3000	0	RM
606Bh	00h	Velocity Demand Value [mm/sec]	INT32	ro			0	TM
606Ch	00h	Velocity Actual value [mm/sec]	INT32	ro			0	TM
607Fh	00h	Max profile velocity [mm/sec]	UINT32	otw	0	3000	2000	RM

Profile position mode

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
6062h	00h	Position demand value [inc]	INT32	ro			0	TM
6064h	00h	Position actual value [inc]	INT32	ro			0	TM
607Ah	00h	Target position [inc]	INT32	rw			0	RM
6081h	00h	Profile velocity [rpm]	UINT32	rw	0	3000	0	RM
6083h	00h	Profile acceleration*	UINT32	rw			Gear-dependent	RM
6084h	00h	Profile deceleration*	UINT32	rw			0	RM
6098h	00h	Homing method	INT8	rw	37	37	37	RM
60E3h	00h	Supported homing methods	INT8	const			1	x
	01h	1st supported homing method	INT8	const			37	x
6099h	00h	Homing speeds	UINT32	rw	0	0	0	x
60F2h	00h	Positioning option code	UINT16	rw				RM

*Values also apply in velocity mode.

For the positioning mode, the direction of rotation „clockwise" (factory setting) must be selected in the default settings!

Required torque values

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
6073h	00h	Max. current (from profile torque mode) [Promille]	UINT16	rw	0	1000	1000	TM
6077h	00h	Actual torque value	INT16	ro				TM
6079h	00h	DC link circuit voltage (UzK)	UINT16	ro	0			TM

General objects

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
6402h	00h	Motor type	UINT16	ro			03h	x
6403h	00h	Motor catalogue number	Visible_ String	otw				x
6404h	00h	Motor manufacturer	String	const			Interroll	x

Factor Group

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
60A8h	00h	SI unit position	UINT32	rw	FDh 01h 00h 00h	FDh 01h 00h 00h	FDh 01h 00h 00h	x
60A9h	00h	SI unit velocity	UINT32	rw	FDh 01h 03h 00h	FDh 01h 03h 00h	FDh 01h 03h 00h	x
60AAh	00h	SI unit acceleration	UINT32	rw	FDh 01h 57h 00h	FDh 01h 57h 00h	FDh 01h 57h 00h	x
6091h	00h	Gear Ratio	UINT8	const			2	x
	01h	Motor Shaft Revolutions	UINT32	otw	9	108	18	x
	02h	Driving Shaft Revolutions	UINT32	otw			1	x
6092h	00h	Feed Constant	UINT8	const			2	x
	01h	Feed [mm]	UINT32	otw			157	x
	02h	Shaft Revolutions	UINT32	otw			1	x
607Eh	00h	Polarity	UINT8	rw	0	0,64,128,192	0	x
60C5h	00h	Max Acceleration [mm/sec^2]	UINT32	rw				x
60C6h	00h	Max Deceleration [mm/sec^2]	UINT32	rw				x

Controlling the power drive system

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
6502h	00h	Supported drive modes	UINT32	ro			37	x

Device information

Object ID	Sub index	Name	Data type	Acc	Min.	Max.	Default	Mapp-able
67FEh	00h	Version number	UINT32	ro			3, 1, 0 - 00030100h	x

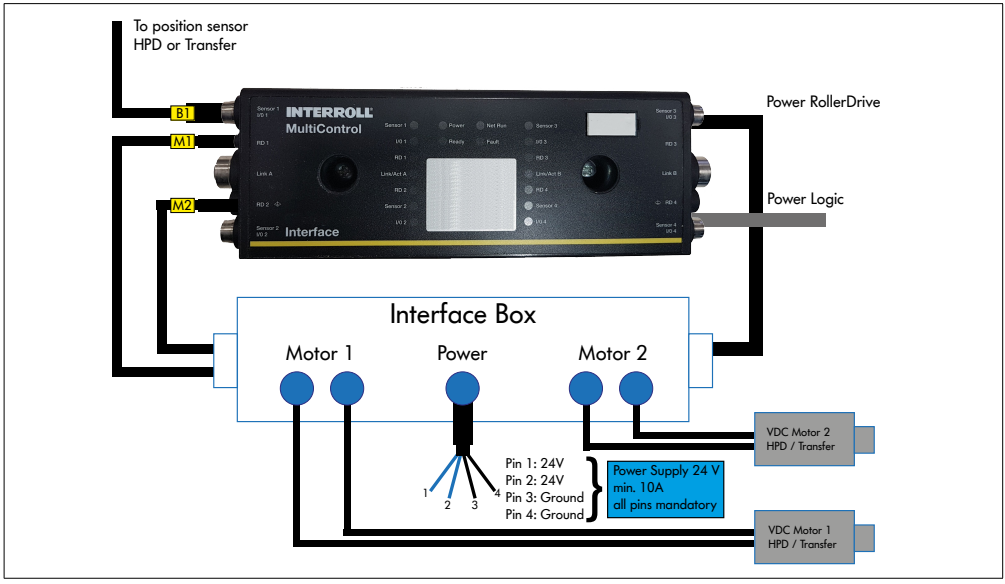
13 Interface boxes for VDC motors

The interface boxes are the interface between the MultiControl and the VDC motors in the Transfer or HPD. The interface box supplies the MultiControl with power.

The two motors and the external power supply are connected to the interface box with M12 connectors.

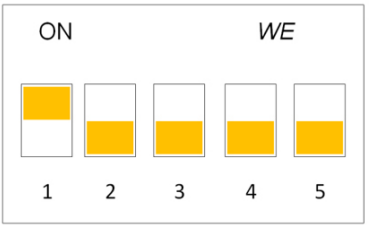
The status LED indicates the operating state of the interface box and the drives.

13.1 Interface Box



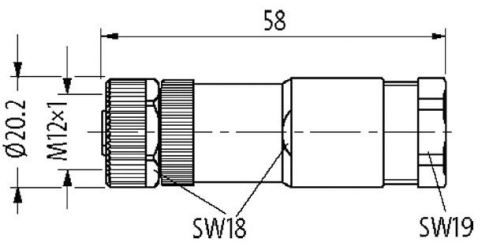
For HPD, a homing process must be performed each time "Power RollerDrive" is switched on.

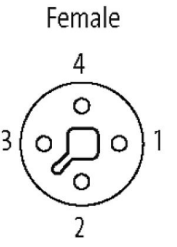
DIP switch on the interface box



Different settings of the DIP switch on the interface box are used to transfer different parameters to the motors, see table.

	1	2	3	4	5
HPD	L	L	L	L	L
Transfer 28 A	H	L	L	L	L
Transfer 20 A	H	H	L	L	L
Transfer 12 A	L	L	H	L	L
Reclaim unit 28 A	L	H	L	L	L
DeepFreeze Transfer	H	L	H	L	L





This connector is included in the scope of delivery.

External cable diameter: 8–10 mm

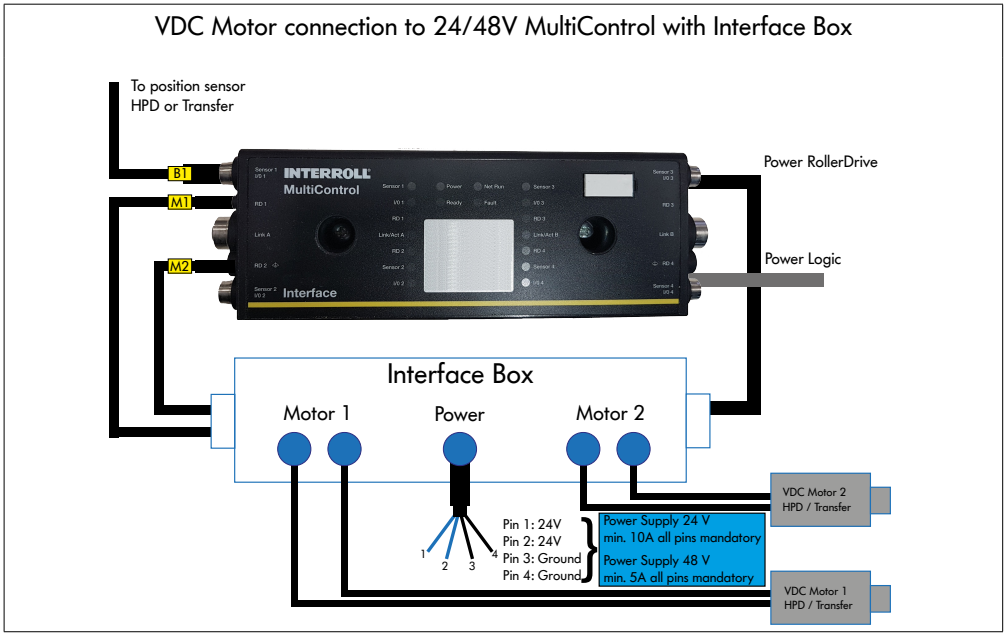
Pins 1 and 2 must both be connected with +24 V.

Pins 3 and 4 must be connected with 0 V.

The MultiControl's Power RollerDrive is connected to the interface box as standard.

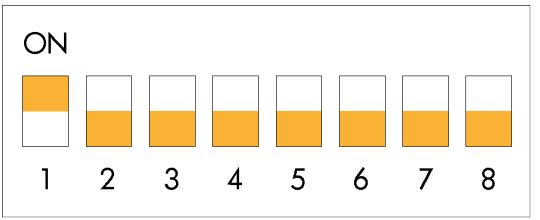
Power Logic must beconnected by the customer.

13.2 Interface Box 48



For HPD, a homing process must be performed each time “Power RollerDrive” is switched on.

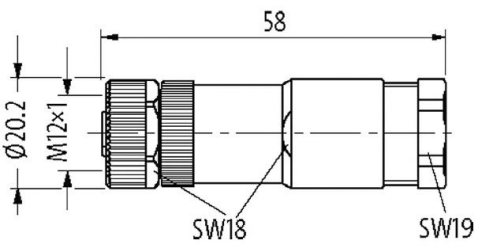
DIP switch on the interface box

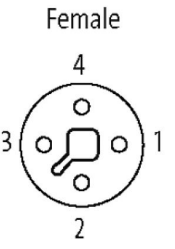


Different settings of the DIP switch on the interface box 48 are used to transfer different parameters to the motors, see table.

	1	2	3	4	5	6	7	8
HPD	L	L	L	L	L	L = 24 V, H = 48 V	H = Motor 1 deactivated	H = Motor 2 deactivated
Transfer 28 A* / 14 A**	H	L	L	L	L			
Transfer 20 A* / 10 A**	H	H	L	L	L			
Transfer 12 A* / 6 A**	L	L	H	L	L			
Reclaim unit 28 A / 14 A	L	H	L	L	L			
DeepFreeze Transfer	H	L	H	L	L			

*24 V **48 V





This connector is included in the scope of delivery.

External cable diameter: 8–10 mm

Pins 1 and 2 must both be connected with +24 V or +48 V.

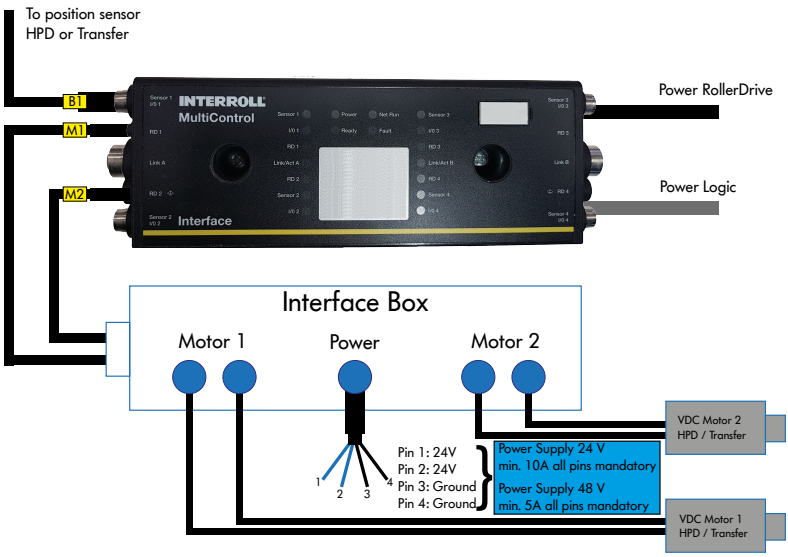
Pins 3 and 4 must be connected with 0 V.

The MultiControl's Power RollerDrive is connected to the interface box as standard.

Power Logic must beconnected by the customer.

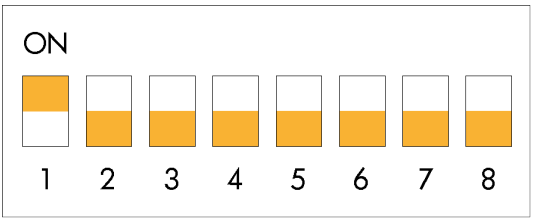
13.3 Interface Box 24/48V

VDC Motor connection to 24/48V MultiControl with Interface Box 24/48V



For HPD, a homing process must be performed each time “Power RollerDrive” is switched on.

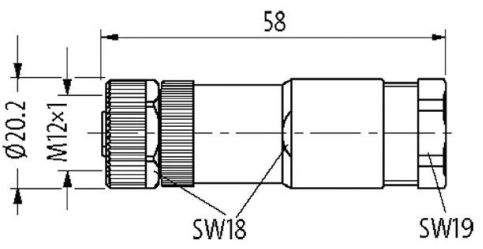
DIP switch on the interface box 24/48V

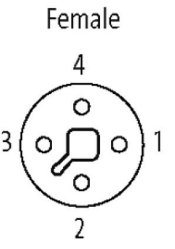


Different settings of the DIP switch on the interface box 48 are used to transfer different parameters to the motors, see table.

	1	2	3	4	5	6	7	8
HPD	L	L	L	L	L	L = 24 V, H = 48 V	H = Motor 1 deactivated	H = Motor 2 deactivated
Transfer 28 A* / 14 A**	H	L	L	L	L			
Transfer 20 A* / 10 A**	H	H	L	L	L			
Transfer 12 A* / 6 A**	L	L	H	L	L			
Reclaim unit 28 A / 14 A	L	H	L	L	L			
DeepFreeze Transfer	H	L	H	L	L			

*24 V **48 V





This connector is included in the scope of delivery.

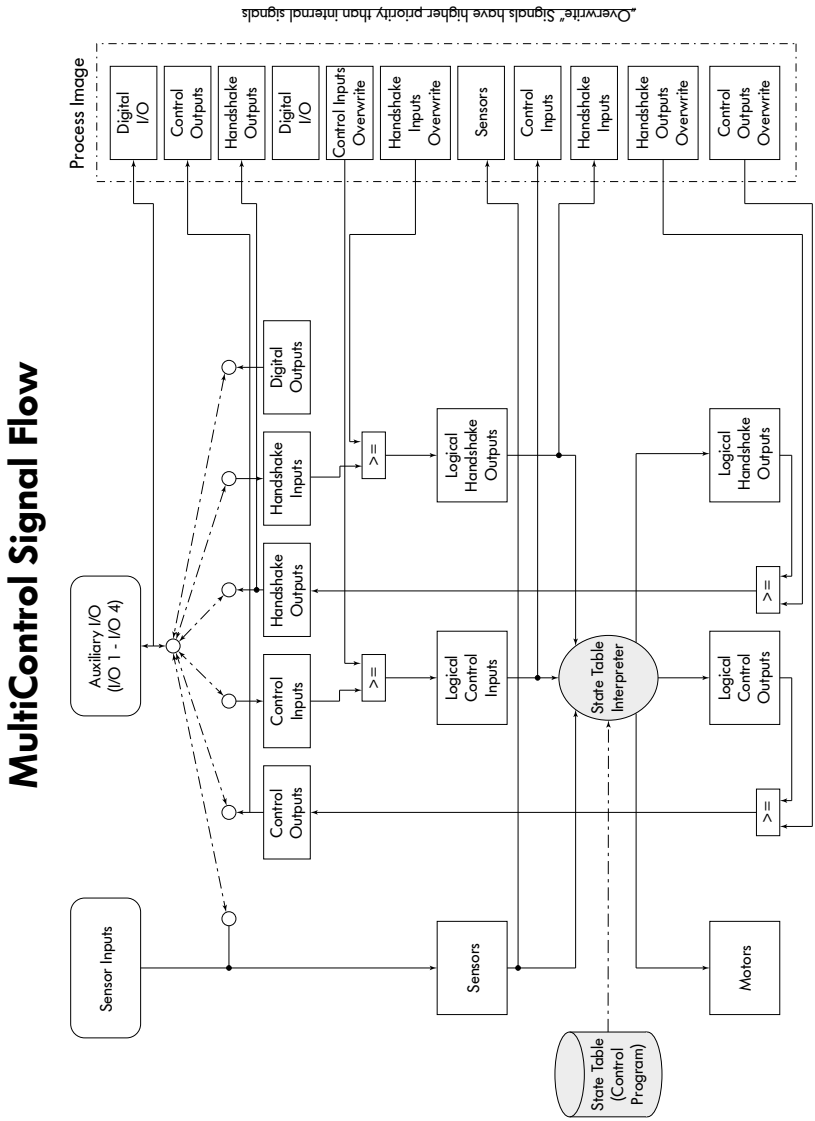
External cable diameter: 8–10 mm

Pins 1 and 2 must both be connected with +24 V or +48 V.

Pins 3 and 4 must be connected with 0 V.

Power Logic may need to be connected by the customer.

14 Signal flow



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