ROTOMATIC – standard version

Standard version is in text marked extra bold.

1 Basic parameters

environment	according to HD60364-5-51:2009	**normal, AA5+AB5**
	according to EN 60721-3-3	**3K3/3B1/3C1/3S1/3M1**
	workplace	**covered, protected against weather**
	temperature	**+5ºC to +30ºC**
	rate of temperature change	**max. 0.5ºC/min.**
	relative humidity	**5% to 85%**
	altitude	**up to 2000 m**
	explosive environment	**no (prohibited)**
	area around machine	**EN 547-1, EN 547-2, EN 547-3**
	interference elimination	**group 1 class B according to EN 55011**
	interference resistance	**EN 61000-4-2, EN 61000-4-3** **EN 61000-4-4, EN 61000-4-6**
operating staff	age	**18 and more**
	burden	**17 kg (reel with film during loading)**
	acquaint with user manual	**obligatory**
revision	initial revision from manufacturer	**IEC 364-6-61**
	revision before operating	**IEC 364-4-41, IEC 364-6-61**
CE certification		**yes for all versions**
service life		**50 000 hours**

		1700						
		Profi + Double	**Profi +**	**Profi**	**Standard + Double**	**Standard +**	**Standard**	**Light**
pneumatic	supply pressure	**0.6 ÷ 1.5 MPa**						
	working pressure	**0.5 MPa**						
	air consumption	**ca 2 l /cycle** **(supporting air blowing for top sheet app. ca 100 l /cycle)**						
dimension of pallet	min.	**600 × 600 mm**						
	max.	**1250 × 1250 mm**						
	min. height of goods	**500 mm (1000 mm with to sheet)**						
	max. height of goods	see table Height of goods						
wrapping foil	diameter of reel	**max. 250 mm**						
	width of foil	**500 mm**						
	tube inner dia.	**75 ÷ 77 mm**						
	length of tube	**500 ÷ 515 mm**						
	height of reel	**ca 17 kg**						
	thickness	**20 – 40 µm**						
	material of foil	**PE (stretch film)**						
	min. stretchness	**150% (PowerFlex PQ,HPQ, SPQ)**						
top sheet film	diameter of reel	**max. 250 mm**						
	width of reel	**max. 1600 mm**						
	tube outside dia.	**min. 100 mm**						
	weight	**max. 80 kg**						
	thickness	**50 – 80 µm**						
	material of film	**PE**						
el. installation	power supply	**TNC-S 3+PE+N 3×400/230V, 50Hz ČSN EN 50160 (EN 50160)**						
	power requirement	45kVA	37kVA	30kVA	32kVA	30kVA	23kVA	18kVA
	protection	125A/gG						

		1700						
		Profi + Double	Profi +	Profi	Standard + Double	Standard +	Standard	Light
	p. supply of control circuit	**24V=**						
shielding	motors	**IP55**						
	switch boxes	**IP54**						
	sensors	**IP65**						
	collectors	**IP20**						
	brake resistor	**IP20**						
	ending equipment (welding)	**IP00**						
radio transmission	job frequency	**5 GHz**						

*) Parameters above are valid for basic version of machine: Rotomatic with one motor prestretch unit without conveyors.

2 Suppliers of component parts

pneumatics		**FESTO**
control system	PLC	**Simatic ET200S, S7-1200** **Schneider M258, M238**
	operator panel	**Siemens: TP177** **Schneider HMIS85**
radio data communication		**Siemens, Phoenix, Zlinx**
sensors		**Telemecanique**
power supply		**Wago**
contactors		**Schneider electric**
circuit breakers		**Schneider electric**
motor protection switch		**Schneider electric**
main switch		**Lovato, ABB**
auxiliary relays		**Schrack, Telemecanique**
safety relays		**Pizzato, Leuze**
distribution frame		**WAGO**
controllers		**Telemecanique**
frequency converters		**Telemecanique**
motors	ring lifting	**SEW**
	ring	**SEW**
	prestretch	**Siemens**
	ending of foil	**Bonfiglioli, Lenze**
	top sheet application unit	**Bonfiglioli, Lenze**
	top-platen	**Bonfiglioli, Lenze**
	conveyors	**Bonfiglioli, Lenze**
cable chains		**Flexa**

3 Security

3.1 Security category

according to EN 13849-1	PL=d
demand on category used in project	4

3.2 Recommended security

prevention of entrance	safety fences
Emergency stop push buttons	security module Pizzato
fences doors	electromechanic lock

feed-in conveyor	safety light barriers Leuze
feed-out conveyor	safety light barriers Leuze

3.3 Time needed to stop machine after pressing emergency stop button

	1700	2300	3000
Light	1,2 s		
Standard, Standard + Double	1,2 s		
Profi, Profi + Double	1.4 s		

4 Colour design

frame	**RAL 9006**	**silver**
moving parts	**RAL 1018**	**yellow**
switchbox cabinet	**RAL 7035**	**grey**
others	**RAL 9005**	**black**
	-	**galvanized and plastic parts without colouring**

5 Heights of goods and wrapping

5.1 Minimum height of goods

(include pallet)

equipment	Minimum height of goods [mm]
without top sheet	**500 (without conveyor)**
with top sheet	**1000 (without conveyor)**

5.2 Bottom border of foil

(minimum heft of botám border of foil above the highest point of the conveyor)

equipment	Bottom border of foil [mm]		
ROTOMATIC	1700		
standard	**100 ÷ 140 (by foil stretch)**		

If there is demand for wrapping of goods together with pallet is necessary to use pallet lifting device
The roller conveyor manufacturer Pragometal Ltd. is a functional roller conveyor plane 10 mm below the highest point of the conveyor (sidewalls).

5.3 Height of conveyor

	Height of conveyor [mm]
standard	**500**
min.	

5.4 Standard wrap and wrapping capacity

Definition:

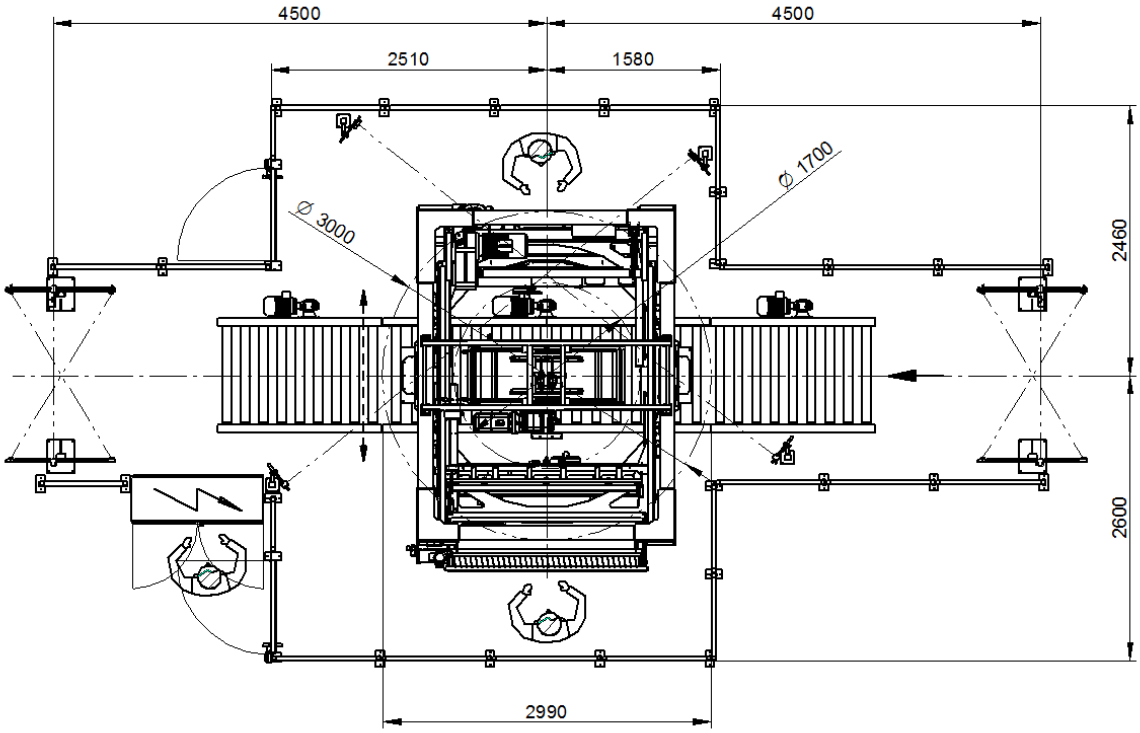
- Single wrap:wrapping only one way when prestretch device move up or down
- Cross wrap: two ways wrapping when prestretch devidce move up and dowm (both direction)
- Dustproof: top-sheet foil is below wrapping foil (into the goods)
- Waterproof: top-sheet foil is between two layers of wrapping foil

Wrap type	single wrapping				
Start the wrapping	at the top		at the bottom		
top-sheet	without top-sheet	dustproof	without top-sheet		waterproof
number of coils – at the top	**1,5**	**2**	**2**		**4**
number of coils – at the bottom	**2**	**2**	**1,5**		**1,5**

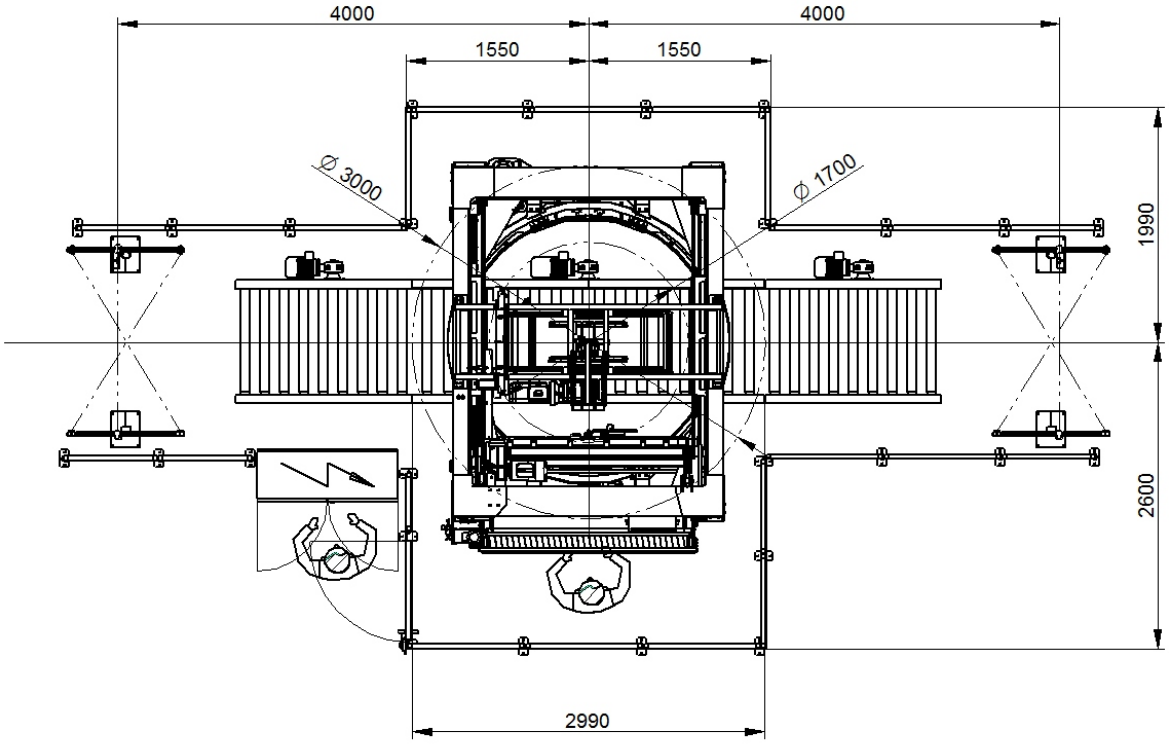
Wrap type	cross wrapping				
Start the wrapping	at the top			at the bottom	
top-sheet	without top-sheet	dustproof	waterproof	without top-sheet	waterproof
number of coils – at the top	**3**	**3**	**4**	**2**	**3**
number of coils – at the bottom	**1**	**1**	**1**	**3**	**3**

6 Build-in dimensions

6.1 Rotomatic 1700 Profi+ Double, Standard+ Double



6.2 Rotomatic 1700 Profi, Profi+, Standard, Standard+, Light



7 Weights

skeleton	extenders			2,25	2.5			
	1700 Standard				**1302 kg**			
	1700 Standard+			**1460 kg**				
	1700 Profi							
	1700 Profi +			**1500kg**	**1580 kg**			

frame		1700	2300	3000
	Standard	**340 kg**		
	Standard + Double			
	Profi			
	Profi + Double	**400 kg**		

Prestretch device (together with ring and counterweight)		1700	2300	3000
	Standard 1MD	**320 kg**		
	Standard 1MR	**350 kg**		
	Standard 1MD-Double			
	Standard 1MDR - Double			
	Profi 1MD	**330 kg**		
	Profi 1MDR			
	Profi 1MD - Double	**400 kg**		
	Profi 1MDR - Double	**420 kg**		

ending of foil		1700	2300	3000
	Standard	**80 kg**		
	Double	**160 kg**		

top sheet applicator		1700	2300	3000
		170 kg		

top-platen		1700	2300	3000
	scissors	**260 kg**		

supporting blower for top sheet		1700	2300	3000
		20 kg		

electro cabinet	2000x1000x400	**ca 350 kg according to equipment of machine**
	2000x1200x400	**ca 400 kg according to equipment of machine**

driven conveyor Rotomatic		900	1100	1200	1300	
	standard 3000	**265 kg**	**295 kg**	**310 kg**		
	standard 4000					
	standard 4500					

driven conveyor	width	900	1100	1200	1300	1400
	length 1330	**125 kg**				

driven conveyor	width	900	1100	1200	1300	1400
	length 1500	**135 kg**	**165 kg**	**175 kg**		
	length 2000	**190 kg**	**210 kg**			
	length 2500	**225 kg**	**255 kg**			
	length 3000	**265 kg**				

pallet lifting device	900	**195 kg**

safety fences	fence part	995 (+ column)	**22 kg**
		815 (+column)	**20 kg**
		545 (+ column)	**15 kg**
	door	right ,left	**50 kg**
		double wing door	**–**

service foot bridge	1700	
	2300	**175 kg**
	3000	**200 kg**

8 Parameters of parts of machine

8.1 Ring

type		1700						
		Profi + Double	**Profi +**	**Profi**	**Standard + Double**	**Standard +**	**Standard**	**Light**
outer diameter of ring	mm	**2400**						
inner diameter of area for pallet at rotation	mm	**1760**						
revolutions	1/min	**60**	**60**	**60**	**45**	**45**	**45**	**35**
motor power	kW	**5,5**	**4**	**4**	**4**	**3**	**3**	**1,5**

8.2 Lift

type		1700						
		Profi + Double	**Profi +**	**Profi**	**Standard + Double**	**Standard +**	**Standard**	**Light**
speed of stroke	**0,55**	**0,55**	**0,275**	**0,414**	**0,414**	**0,207**	**0,161**	
motor power	**7,5**	**7,5**	**5,5**	**5,5**	**5,5**	**2,2**	**1,5**	

8.3 Prestretch device

type		**Profi 1MD**	**Standard 1MD**	**Light 1MD**		**Profi 2MD**	**Standard 2MD**
regulation of pre-stretch of film		**1 motor + transmission**				**2x motor**	
motor power	kW	**2,5**	**1,8**	**1,5**		**2,5/1,8**	**1,8/1,5**
primary pre-stretch	%	80, 120, **160**, 210, 290				**80-400**	
change of pre-stretch ratio		**change of belt and pulley**				Systém	
secondary pre-stretch	%	**60 ÷ 200 *)**					

*) Limiting values depends on used material (foil) and way of wrapping

8.4 Top-platen scissors type

type		1700						
		Profi+	**Profi**	**Standard+**	**Standard**	**Light**		
motor power	kW	**1,1**	**0,75**	**1,1**	**0,75**	**0,75**		
dimensions of pressing board	mm	**1000x600**						
max. pressing power without supporting air blowing	kg	**cca 100**						
max. pressing power with supporting air blowing	kg	**cca 120**						

9 Additional equipment

9.1 Driven conveyor

type		**Roto**			**standard**				
width	mm	900	1100	1200	900	1100	1200	1300	1400
nominal length		3000 (for ROTO 1700) 4000 (for ROTO 2300) 4500 (for ROTO 3000)			1350 1500 2000 2500 3000	1500 2000	1500		
height	mm	optionally (350, 480, 530, 580, 630) ± 60							
diameter of rollers	mm	80							
spacing	mm	182.5			166.5				
motor		550W / 3x400V 50Hz							
chain		10B							
maximum load	kg	1600	1500	1500	1600	1500	1500		
speed	m/min	12							

9.2 Pallet lifting device

to roller conveyors		**900**	**900**		
air	MPa	0.6 ÷ 1	0.6 ÷ 1		
supplier of pneumatics		FESTO	FESTO		
height min.	mm	450 ÷ 575 (during assembly)	450 ÷ 575 (during assembly)		
height max.	mm	600 ÷ 725	600 ÷ 725		
stroke of pallet	mm	140	140		
air consumption		ca 6 l per stroke	ca 6 l per stroke		
speed of stroke		3-6 according to load and air supply	3-6 according to load and air supply		
max. load	kg	1200	1200		
max. width of lifting d.	mm	860	860		
width of lifting plinth	mm	860	860		
nr. of solid plinths		3	5		
nr. of tilting plinths		–	–		
spacing of solid plinths	mm	380 (outer 760)	190 (outer 760)		
spacing of tilting plinths	mm	–	–		
length of proper lifting d.	mm	1084	1084		
width of pallet min. –max.	mm	600 ÷ 900	600 ÷ 900		
length of pallet	mm	900 ÷ 1200	600 ÷ 1200		

9.3 Fences

overall height	mm	2145
height from floor	mm	165
execution of door		one wing door right, one wing door left, two wing doors, sliding door right, sliding door left
width of doors	mm	800 one wing
widths of fence parts	mm	1000, 800, 650, 500, 300,
sieve mesh size	mm	40×40
thickness of fencing	mm	3.1

10 Communication signals

10.1 Without conveyor control

10.1.1 Meaning of signals

INPUT SIGNALS from conveyor to wrapper

1. **Start of wrapping**
2. **Possible to wrap** (external stop)
3. **Assortment 1**
4. **Assortment 2**
5. **Assortment 3**
6. **Fencing doors closed**
7. **Slowdown of machine**

Note: Signals **Assortment 1, Assortment 2, and Assortment 3** are optional, using combinations of these signals is possible to choose one of 8 preset wrapping programs (if this function is not used program nr. 0 will be started).
If **Possible to wrap** signal is inactive, all movements of machine are blocked, running program is interrupted, interrupted program is terminated by following descending edge of **Possible to wrap** signal.
The **Slowdown of machine** will reduce the machine speed to the value set in the parameters. Serves to reduce stress mechanisms at reduced power lines

OUTPUT SIGNALS from wrapper to conveyor

1. **Input conveyor free** - signalize state where nothing obstructs free passage of pallet under machine.
2. **Output conveyor free** - signalize state where nothing obstructs free passage of pallet out of the machine (used only in case of equipment, machines second position of the reference frame)
3. **End of wrapping** - closes at the end of wrapping cycle on and off when ready to start
4. **Wrapper automat ready** – wrapper in automatic mode without failure
5. **Failure** - disconnect when any failure on wrapper occurs (for ex. out of film, opened covers)
6. **Foil running out** - if the machine is equipped with an auxiliary device signals running out of wrapping foil
7. **Permission to unlock the door** - closes when the machine is at rest and can open doors fencing

FUNCTIONS OF MACHINE

1. If **Conveyor free** then system control of conveyors can send pallet into machine.
2. Conveyor control system stop pallet in the middle of wrapping area.
3. Conveyor control system order **Start of wrapping** (impulse 1s is enough). Start is not accepted, if not over the end of the packaging signal or not signal free line (wrapping machine is running)
4. Wrapping machine accomplish programmed wrapping cycle.
5. Wrapping machine report **End of wrapping** (impulse 1s is enough).
6. If **Output conveyor free** is on conveyor control system (unless the machine has a second location reference frame used to signal **Output conveyor free**) can out feed the pallet.

Wrapper -> Conveyor

Input conveyor free

Output conveyor free

End of wrapping

Conveyor -> Wrapper

Start of wrapping

Wrapping is possible

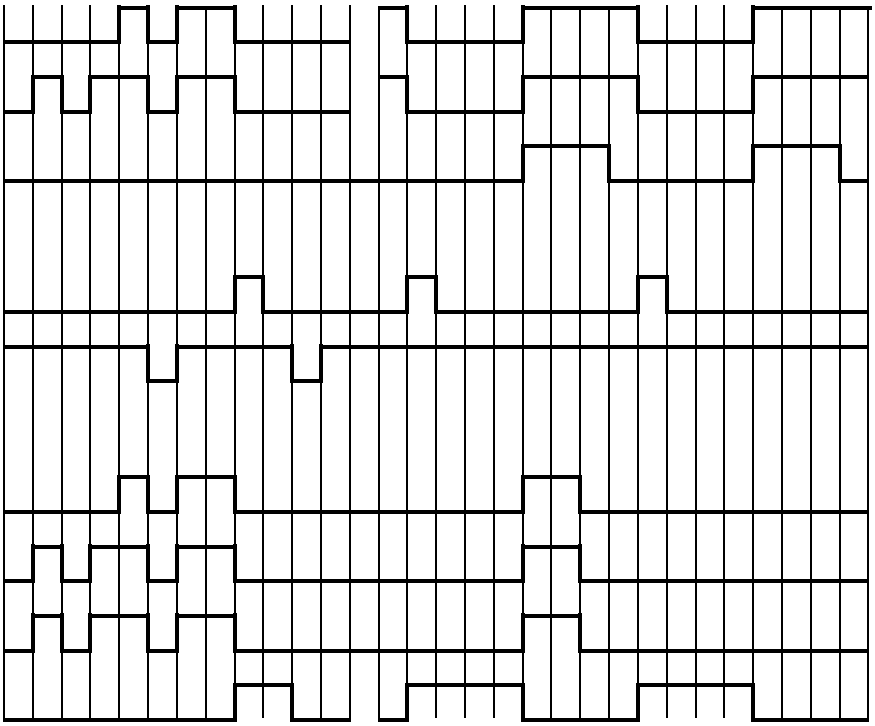
Action

Conveyor before wrapper

Conveyor below wrapper

Conveyor behind wrapper

Wrapping



10.1.2 Communication with the host system using digital signals

INPUT SIGNALS from the conveyor packages are implemented by one NO contact 24V DC 200 mA located in the electric cabinet of conveyor.

OUTPUT SIGNALS from the deck into the conveyor are carried out one NO contact 24V DC 200 mA in the electric cabinet of wrapper. When the main switch is off , the value of signals is 0.

10.1.3 Communication with SIMATIC-controlled supervisory system (connected via Ethernet - S7 Connection)

The control system reads and writes the value of communication signals from the control system packages. The address list will be passed in the implementation.

10.1.4 Communication with the host system via Ethernet (TCP / IP)

The control system sends a communication wrapper sentence in the frequency of xx bytes / s and is currently awaiting sentence from a parent communication system in the same frequency.

Sentence description of communication emitted by the wrapper

Sentence description of communication expected by the wrapper

10.2 With control of conveyors (per order)

Wrapper controls its conveyor.
Conveyors before and behind of wrapper controls neighbouring line (thereinafter neighbouring).

10.2.1 Meaning of signals

SIGNALS from neighbourhood to wrapper

1. **Palette on entrance** (permanent signal) – on the conveyor before wrapper is palette ready for sending on wrapper conveyor
2. **Free on exit** (permanent signal) - conveyor behind wrapper is free
3. **Palette received on exit** (pulse1s) – palette reach sensor on conveyor behind wrapper
4. **Assortment 1**
5. **Assortment 2**
6. **Assortment 3**
   Slowdown of machine

Note: Signals are realized by one switching contact 24V DC 200mA placed in switchbox cabinet of conveyor.
Signals **Assortment 1, Assortment 2, and Assortment 3** are optional, by their combinations is possible remotely choose one of 8 preset wrapping programs (if they are not used, program No. 0 will be started). The wrapping machine scans the status of signals of the goods range during the travel of the pallets from the conveyor of the superior line to the first conveyor of the wrapping machine (the signal must be constant during the whole period of the pallet travel)
The **Slowdown of machine** will reduce the machine speed to the value set in the parameters. Serves to reduce stress mechanisms at reduced power lines

SIGNALS from wrapper to neighbourhood

1. **Free on entrance** (permanent signal) – wrapper conveyor is free
2. **Palette on exit** (permanent signal) – on wrapper conveyor is palette ready for sending on conveyor behind wrapper.
3. **Palette received on entrance** (impulse 1s) - palette reach sensor on wrapper conveyor
4. **Wrapper automat ready** – wrapper in automatic mode without failure
5. **Fault** - opens the wrapper in case of failure (eg consumed foil, cover open).
6. **Foil running out** - if the machine is equipped with an auxiliary device signals running out of wrapping foil
7. **Permission to unlock the door** - closes when the machine is at rest and can open doors fencing

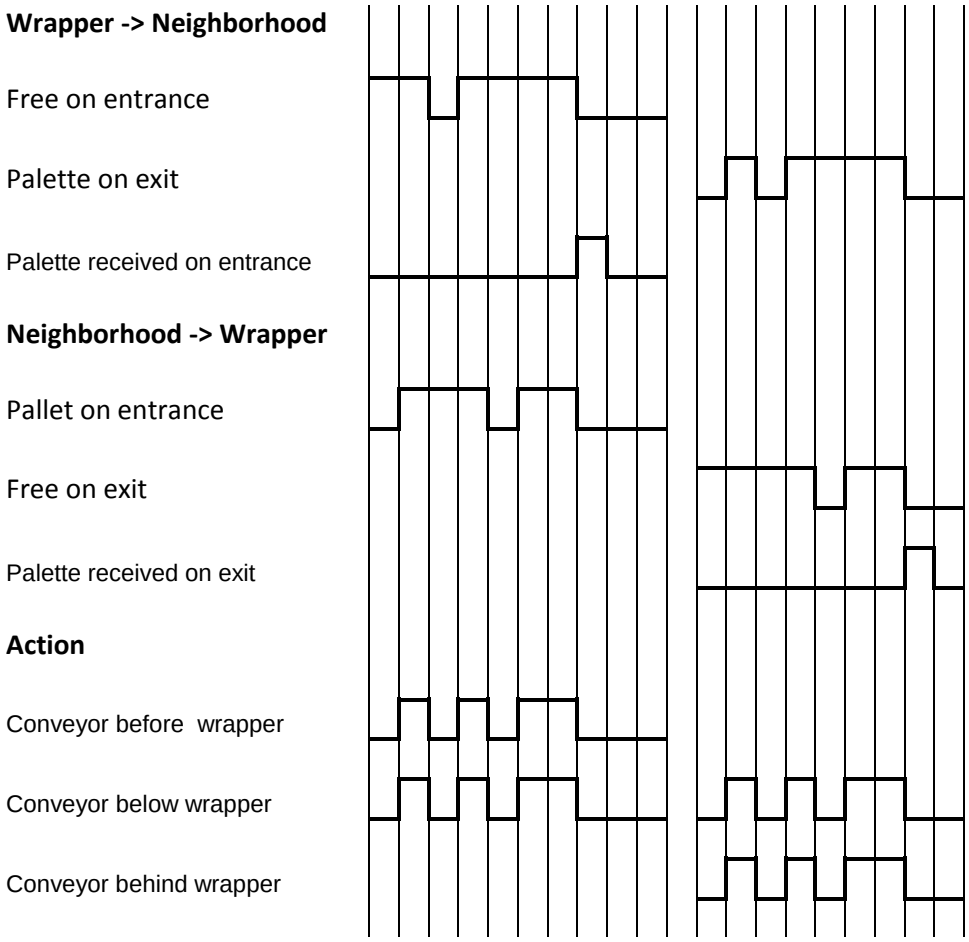
Note: Signals are realized by one switching contact 24V DC 200mA placed in switchbox cabinet of wrapper.
Signals have logical value **0 in** manual mode and when the machine is switched off

FUNCTIONS OF LINE

1. Feeding in of palette is possible if **Palette is on entrance** and **is Free on entrance** (it does not matter, which command occurs earlier).
2. Neighbourhood starts conveyor before wrapper, wrapper start conveyor of wrapper – palette is feeding in on wrapper conveyor.
3. If during feeding in one of the signal **Palette on entrance** or **Free on entrance** falls down, moving of pallets is stopped. After restoring of the signal is possible to continue.
4. Pallet is stopped on pallet sensor on wrapper conveyor, wrapping machine answers **Pallet received on entrance (**signal 1s), feeding in is finished by this way.
5. Feed out of the pallet is possible if the **Palette is on exit** and if is **Free on exit** (does not matter, which command occurs earlier).
6. Wrapper starts wrapper conveyor, neighbourhood starts conveyor behind wrapper – pallet is feeding out on conveyor behind wrapper.
7. If during feeding out of the pallet falls down one of the signal **Palette on exit** or **Free on exit**, moving of pallets is stopped. After restoring of the signal is possible to continue.
8. Pallet stops on sensor of the pallet on conveyor behind wrapper, neighbourhood answers **Palette received on exit** (signal 1s), feeding out is finished by this way.

Note: If wrapper controls more conveyors:
- for feeding in: wrapper conveyor = first conveyor controlled by wrapper
- for feeding out: wrapper conveyor = last conveyor controlled by wrapper
- Pallets are moved in sequence from previous conveyor to the next conveyor (if it is free).

If pallets are taken off from conveyor controlled by wrapper:
- description of the function for exit and signals are not valid
- feeding out conveyor is considered as busy 20s yet (it is possible to adjust) after pallet is taken off- replace sensor of the fork lift.



1.1.1. Communication with the host system using digital signals

INPUT SIGNALS from the conveyor packages are implemented by one NO contact 24V DC 200 mA located in the electric cabinet of conveyor.

OUTPUT SIGNALS from the deck into the conveyor are carried out one NO contact 24V DC 200 mA in the electric cabinet of wrapper. When the main switch is off , the value of signals is 0.

10.2.2 Communication with SIMATIC-controlled supervisory system (connected via Ethernet - S7 Connection)

The control system reads and writes the value of communication signals from the control system packages. The address list will be passed in the implementation.

10.2.3 Communication with the host system via Ethernet (TCP / IP)

The control system sends a communication wrapper sentence in the frequency of xx bytes / s and is currently awaiting sentence from a parent communication system in the same frequency.

10.3 INITIALISATION OF THE LINE

Initialisation runs after each start of wrapper and each switchover in to automatic mode – wrapper trays to find loss pallets (in between conveyors or between sensors).
Initialisation is unable to solve all failure states, due to this operator attendance is necessary.

1. Operator check state of wrapper, switchover wrapper in to manual mode, sets wrapper in to initial position (if it is necessary) and switchover back in to automatic mode.
2. Conveyors, which does not have screened sensor, are set in to motion for 10s.
3. Pallet stops on the nearest sensor, if the pallet was between sensors.
4. If pallet was on boundary line of conveyors, next conveyor is started and trays to pull over the pallet.
5. Operator has to check position of the pallets after finishing of initialisation, eventually adjust their position in manual mode.
6. If there is a busy conveyor in wrapping space, operator must decide if to wrap pallet or to send away.
7. Wrapper gives communication signals in to neighbourhood after finishing of initialisation.

10.4 Operation of the Machine during Switch-Over from Automatic Mode to the Manual Mode and Back in Dependence on Configuration of the Line

A. Conveying tracks only inside the safety area of the wrapping machine (1 switch R/A)

1. Switch of the manual and automatic mode for the wrapping machine

Switch-over from the automatic mode to the manual mode
- the wrapping machine stops
- tracks stop (the system remembers positions of the pallets according to shading of the sensors)
- Manual functions of wrapping machine as well as of tracks are available

Switch-over from the manual mode to the automatic mode
- Inquiry - **Tracks Continue / Initialize**:
  - - **Continue** – tracks continue in the operation before switch-over to the manual mode *).
  - - **Initialize** – system forgets the positions of the individual pallets and searches for their positions again.
- Inquiry – **Wrap the pallet Yes/No**.
  - - **Yes** – the wrapping machine wraps the pallet.
  - - **No** – wraps machine considers the pallet as wrapped and removes it.

B. Conveying tracks inside and outside the safety area of the wrapping machine (2 switches R/A) *(per order)*

1. Switch of the manual and automatic mode for the wrapping machine

Switch-over from the automatic mode to the manual mode
- the wrapping machine stops
- tracks **inside the safety area** of the wrapping machine stop (the system remembers positions of the pallets according to shading of the sensors)
- only manual functions of the wrapping machine are available

Switch-over from the manual mode to the automatic mode
- Inquiry – **Tracks in the wrapping machine area Continue**. (only when the switch for tracks mode is in position Automatic mode)
  - - **Continue** – tracks continue in operation before switch-over to the manual mode *).
- Inquiry – **Wrap the pallet Yes/No**.

2. Switch of the manual and automatic mode for the tracks

Switch-over from the automatic mode to the manual mode
- **All** tracks stop (the system remembers positions of the pallets according to shading of the sensors)
- It serves only for holding of the operation of track program – for access to manual functions it is necessary to switch the machine to the manual mode.

Switch-over from the manual mode to the automatic mode
- Inquiry – **Tracks Continue/Initialize**

*) In case that shading of sensors does not correspond to the remembered status, the control system will request initialization or correction in the manual mode.