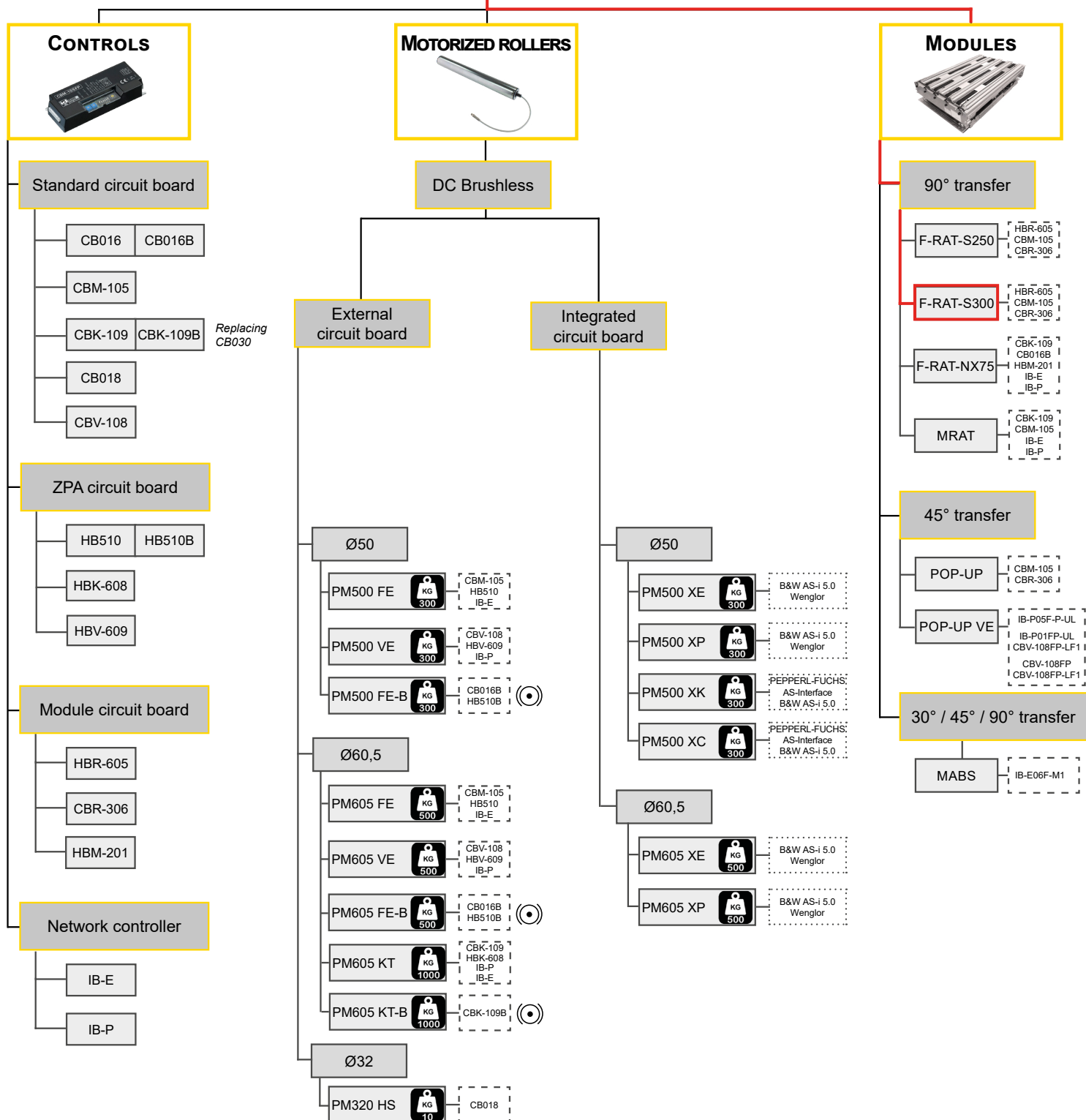


# F-RAT-S300 SERIE

TECHNICAL DOCUMENTATION

**POWER MOLLER®**

# POWER MOLLER® solutions



Corresponding circuit board    
 Compatible module / sensor    
 Max load to be conveyed    
 (⊙) Mechanical brake version

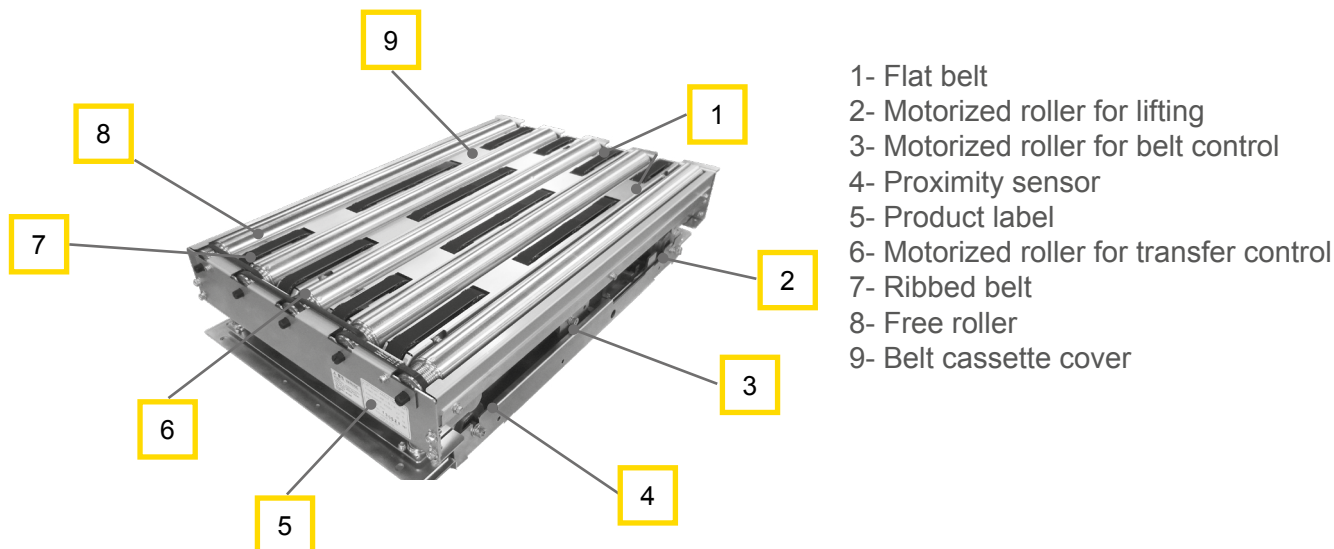
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## 1. PRESENTATION OF THE SERIES

This transfer module, which uses 24 V DC Brushless Motorized Roller technology, is very compact and its «cassette» structure is easy to integrate into both new and reconditioned conveyors. It can be moved on your conveyor lines for order picking, distribution or on assembly lines to adapt to your logistical changes.

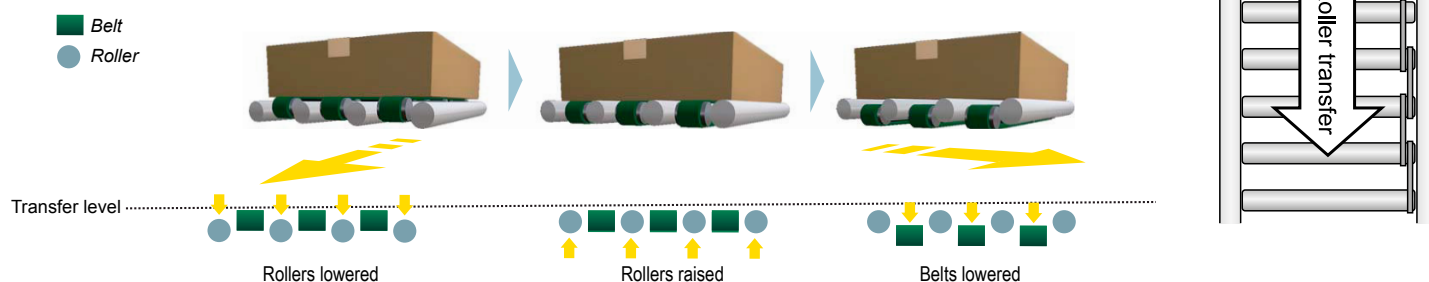
### STRUCTURE



### OPERATING PRINCIPLE

This multi-directional transfer module works with three brushless motorized rollers, at very low voltage (24 V DC), without pneumatic or other types of energy.

Transfer is smooth without any change in level. Only one motor runs at any one time and only uses 50 W during nominal operation.



### BOTTOM SURFACE OF LOAD TO BE CONVEYED

This transfer table is made to transfer carton boxes or plastic trays with flat bottom, smooth and dry. It is not designed to transfer trays with ribbed bottom, in plastic or metal. For tote with not flat bottom, please consult us.



## GENERAL TECHNICAL DATA

| Type of motor                              |                                 | PM500FE (External circuit board)                                                                                                      | PM500XP (Internal circuit board)        |
|--------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Dimensions (mm)                            | Width (transfer direction)      | Size A=379 ; Size B=497 ; Size C=597 ; Size D=697                                                                                     |                                         |
|                                            | Length (belt direction)         | A - B - C - D                                                                                                                         | B - C - D                               |
|                                            | Height                          | Size A=758 ; Size B, C and D = 753,2                                                                                                  |                                         |
| Speed                                      |                                 | 170                                                                                                                                   |                                         |
| Level difference transfer belt-roller (mm) |                                 | 60m/min max (adjustable)                                                                                                              |                                         |
| Frame                                      |                                 | 10                                                                                                                                    |                                         |
| Motorized rollers                          | Zinc-coated steel               |                                                                                                                                       |                                         |
|                                            | Diameter / Material / Treatment | ø50mm / Zinc-coated steel as standard ( Coating, optionnal sleeve)                                                                    |                                         |
|                                            | Cable length                    | 1500 mm                                                                                                                               | 450 mm                                  |
|                                            | Connector                       | JST 9p mâle                                                                                                                           | M8-5p mâle                              |
| Proximity sensor                           |                                 | CBM-105-FP1-EU1                                                                                                                       |                                         |
|                                            |                                 | N/A                                                                                                                                   |                                         |
|                                            |                                 | PNP, normally open contact 24VDC (NO)<br>Absorbed current ≤15mA output signal 100mA max<br>Cable length : SN-S = 500mm / SN-R = 450mm |                                         |
| Belts                                      | Ribbed belt                     | Ribbed belt 3 ribs                                                                                                                    |                                         |
|                                            | Flat belt                       | Habasit TF10L 1630W19 Ver. anti-static                                                                                                |                                         |
| Power supply                               | Voltage                         | 24VDC ± 10%                                                                                                                           |                                         |
| Input power                                | On start-up                     | 96W                                                                                                                                   |                                         |
|                                            | Nominal                         | 50W                                                                                                                                   |                                         |
| Environment                                | Ambient temperature             | 0 à 40°C                                                                                                                              |                                         |
|                                            | Humidity                        | Less than 90% relative humidity without condensation                                                                                  |                                         |
|                                            | Vibration                       | ≤0,5G                                                                                                                                 |                                         |
|                                            | Sound level                     | <70dB                                                                                                                                 |                                         |
|                                            | Lightning                       | The product is used only inside a building, the protection against lightning is done by the building itself.                          |                                         |
| Protection rating                          | Motorized roller                | IP54                                                                                                                                  |                                         |
|                                            | Circuit board                   | IP20                                                                                                                                  | NA                                      |
| Accessories (Option)                       |                                 | Extension cable 1,2m                                                                                                                  | M8-5p Female cable 2 M<br>Speed adaptor |

| Size                                 |                              | A                         | B                                                                 | C             | D             |
|--------------------------------------|------------------------------|---------------------------|-------------------------------------------------------------------|---------------|---------------|
| Dimensions WxLxH (mm)                |                              | 379x758x170               | 497x753,2x170                                                     | 597x753,2x170 | 697x753,2x170 |
| Frame air gap mini (mm)              |                              | 381                       | 500                                                               | 600           | 700           |
| Load dimensions lxL (mm)             | Mini                         | 300x300                   |                                                                   |               |               |
|                                      | Max.                         | 300x650                   | 400x650                                                           | 500x650       | 600x650       |
| Max load to be conveyed*             |                              | 37,5                      | 50                                                                | 50            | 50            |
| Number of belts                      | Standard                     | 3                         | 4                                                                 | 4             | 4             |
|                                      | Supplement (max)             | 0                         | 0                                                                 | 1*            | 2*            |
| Number of transfer rollers           | Standard                     | 4                         | 5                                                                 | 6             | 7             |
| Motorization                         | PM500FE (ext. circuit board) | YES                       | YES                                                               | YES           | YES           |
|                                      | PM500XP (int. circuit board) | NO                        | YES                                                               | YES           | YES           |
| Weight (Kg)                          |                              | 37                        | 43                                                                | 49            | 55            |
| Coating / sleeve on rollers (option) |                              |                           | Natural rubber, polyurethane, PVC in thickness 3mm<br>Consult us. |               |               |
| Wheel                                |                              |                           | POM ( Polyacetal )                                                |               |               |
| Accessories (Option)                 |                              | Zinc-coated steel support |                                                                   |               |               |

\* For FE version only : please consult with us.

## 2. TRANSFER CAPACITY

### TRANSFER TIME

$$\begin{array}{|c|} \hline \text{Receiving time} \\ \text{(sec)} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Change time} \\ \text{Belt/roller transfer (sec)} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Discharge time (sec)} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{TRANSFER TIME} \\ \hline \end{array}$$



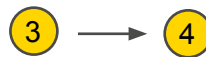
Package length (mm)

$(\text{Transfer speed}^* \text{ (m/min)} / 60) \times 1000$

\* Average speed between package in-feed and outfeed

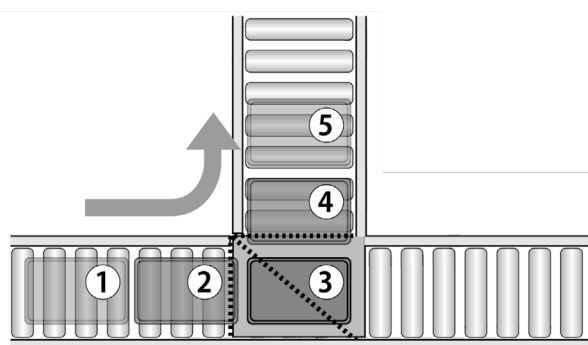


Direction change time is 0.78 (sec)



Discharge time (graph 1) + Additional time depending on the weight of the package (table 1)

From reception of the package until the next package is ready to be transferred on the F-RAT-S300, after the package has been fully discharged.



GRAPH 1

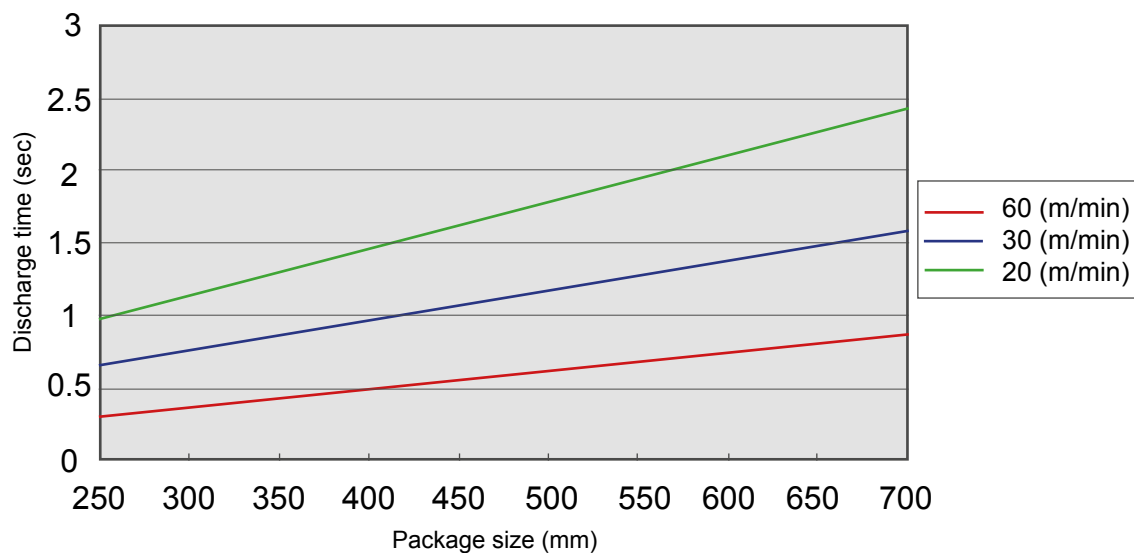
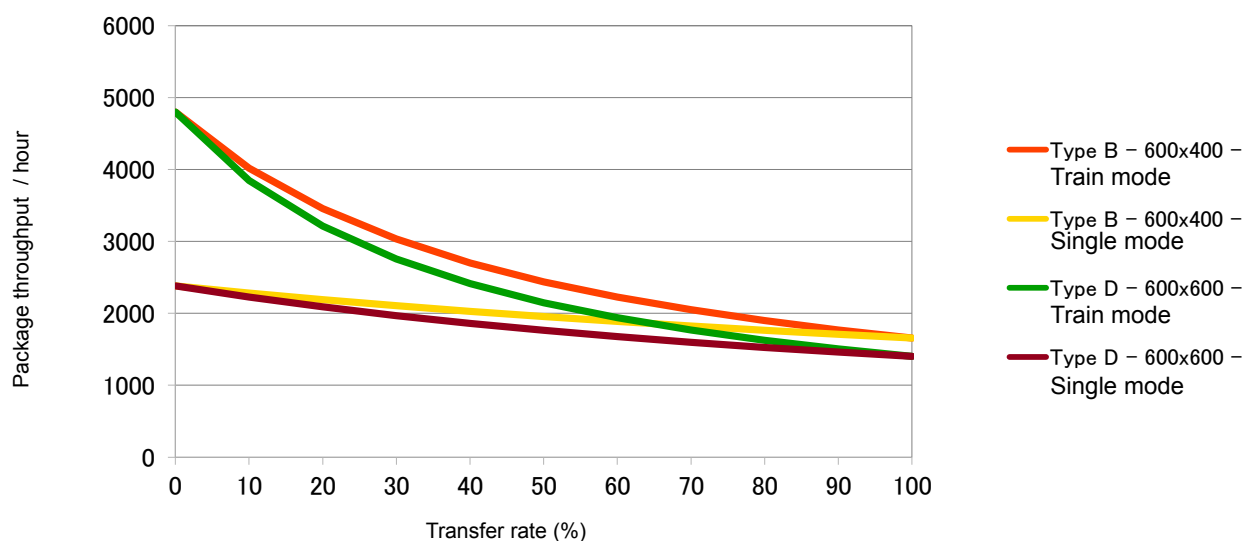


TABLE 1

|                       |     |     |     |     |     |
|-----------------------|-----|-----|-----|-----|-----|
| Package weight (kg)   | 10  | 20  | 30  | 40  | 50  |
| Additional time (sec) | 0.1 | 0.2 | 0.3 | 0,4 | 0,5 |

NOTE : Transfer time may vary according to the load, its transfer method (step by step, continuous), upstream and downstream conveyor speed and other factors.

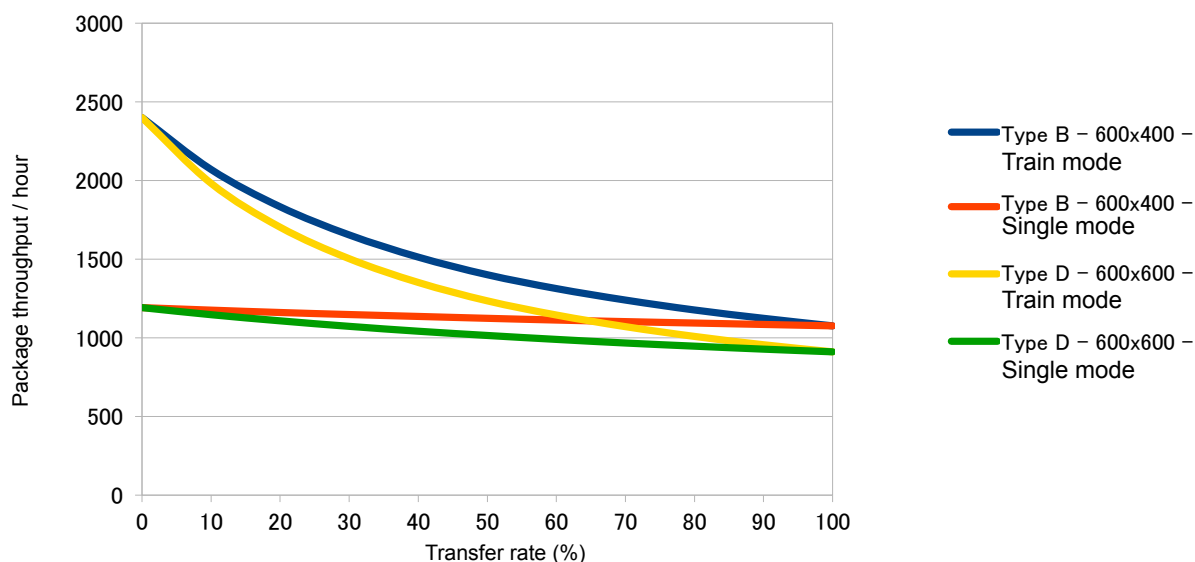
## TRANSFER RATE



Attention : Performance are given as a rough guide for motorized roller controled with CBM-105 .

- Cardboard and plastic box
- Weight : 30 kg
- Speed code : 60m/min

Package throughput depends on the dimensions and material of the package, as well as speed, transfer method, transfer rate...  
The curves are given as a rough guide.



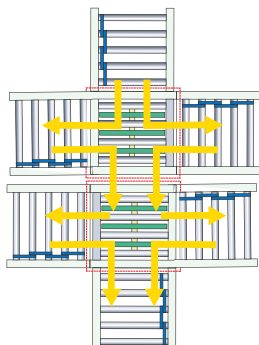
- Cardboard and plastic box
- Weight : 30 kg
- Speed code : 30m/min

Package throughput depends on the dimensions and material of the package, as well as speed, transfer method, transfer rate...  
The curves are given as a rough guide.

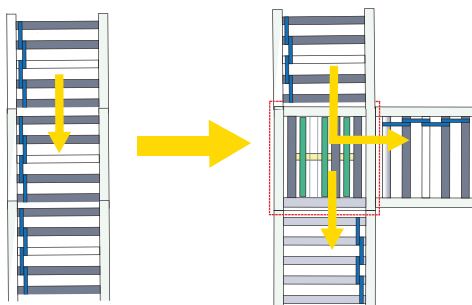


Time and transfer capacity are given as an indication. They can be modified according to various factors such as the nature of the package to be conveyed, the performance of the input / output signal, control, etc.

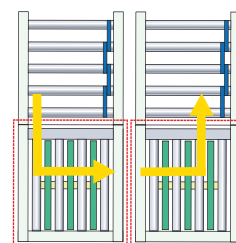
### 3. APPLICATIONS



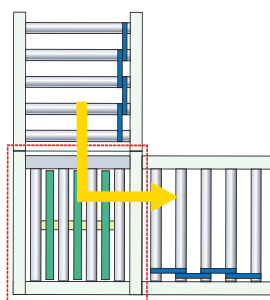
BUFFER MANAGEMENT



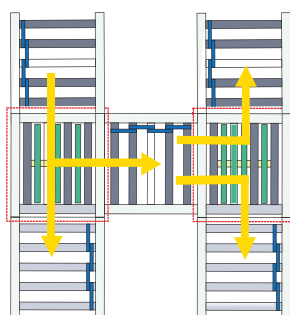
RENOVATION / MODIFICATION



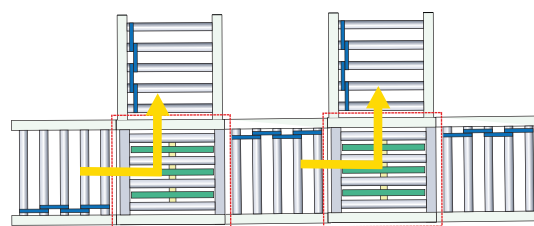
180° TRANSFER



90° TRANSFER



FREE FLOW



SORTING

#### ORDERS PREPARATION



#### TRANSFER



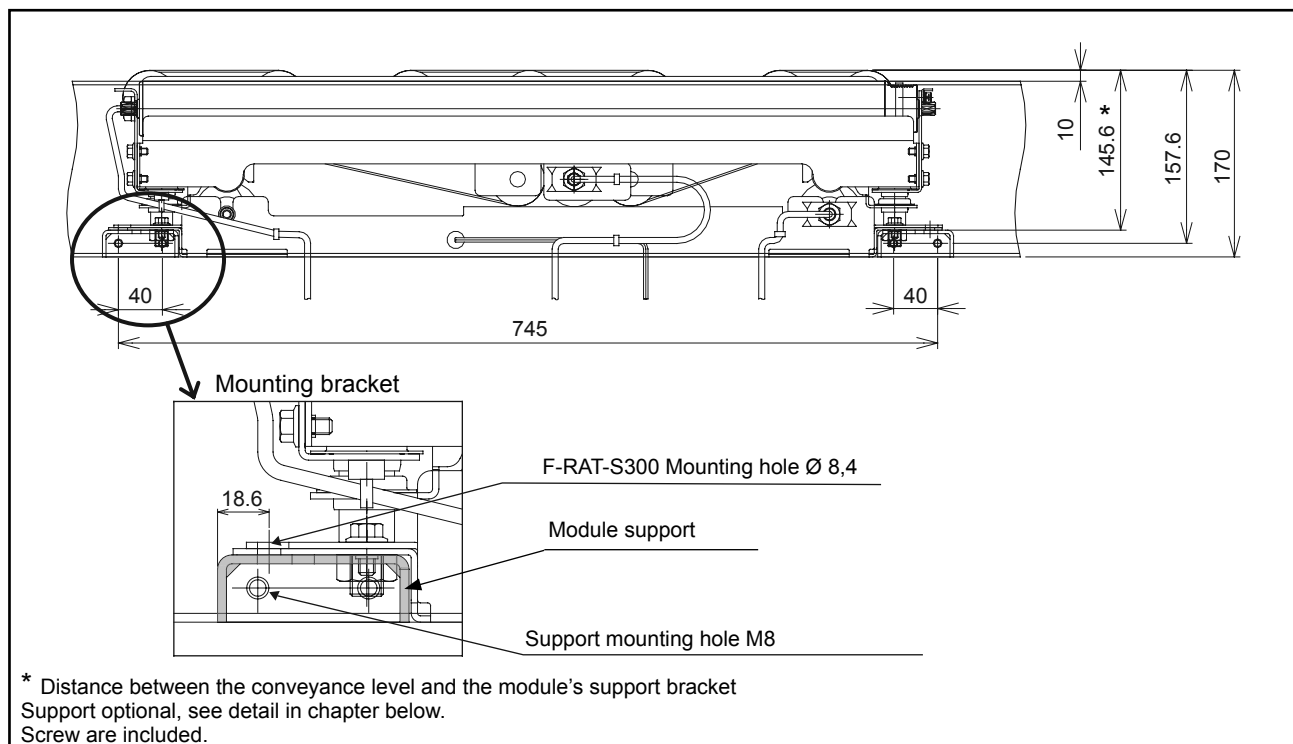
#### SORTING



## 4. INSTALLATION OF THE MODULE F-RAT-S300

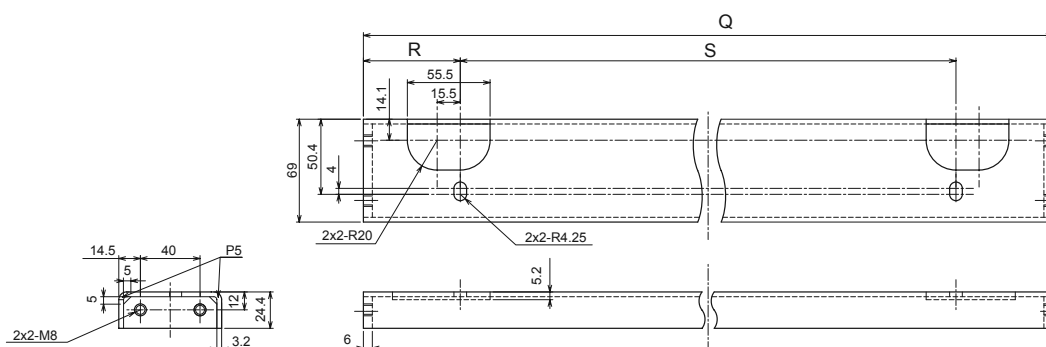
### ASSEMBLY PRINCIPLE

The cassette-type structure is inserted between the conveyor frame and fixed to two brackets (in option) with the aid of four M8 screws.



### MODULE SUPPORT (OPTION)

| F-RAT-S300 size | Dimensions |     |      | Number of support | Reference        |
|-----------------|------------|-----|------|-------------------|------------------|
|                 | Q          | S   | R    |                   |                  |
| Size A          | 381        | 252 | 64.5 | 2                 | SP-FRAT-S-A-0381 |
| Size B          | 500        | 370 | 65   | 2                 | SP-FRAT-S-B-0500 |
| Size C          | 600        | 470 | 65   | 2                 | SP-FRAT-S-C-0600 |
| Size D          | 700        | 570 | 65   | 2                 | SP-FRAT-S-D-0700 |



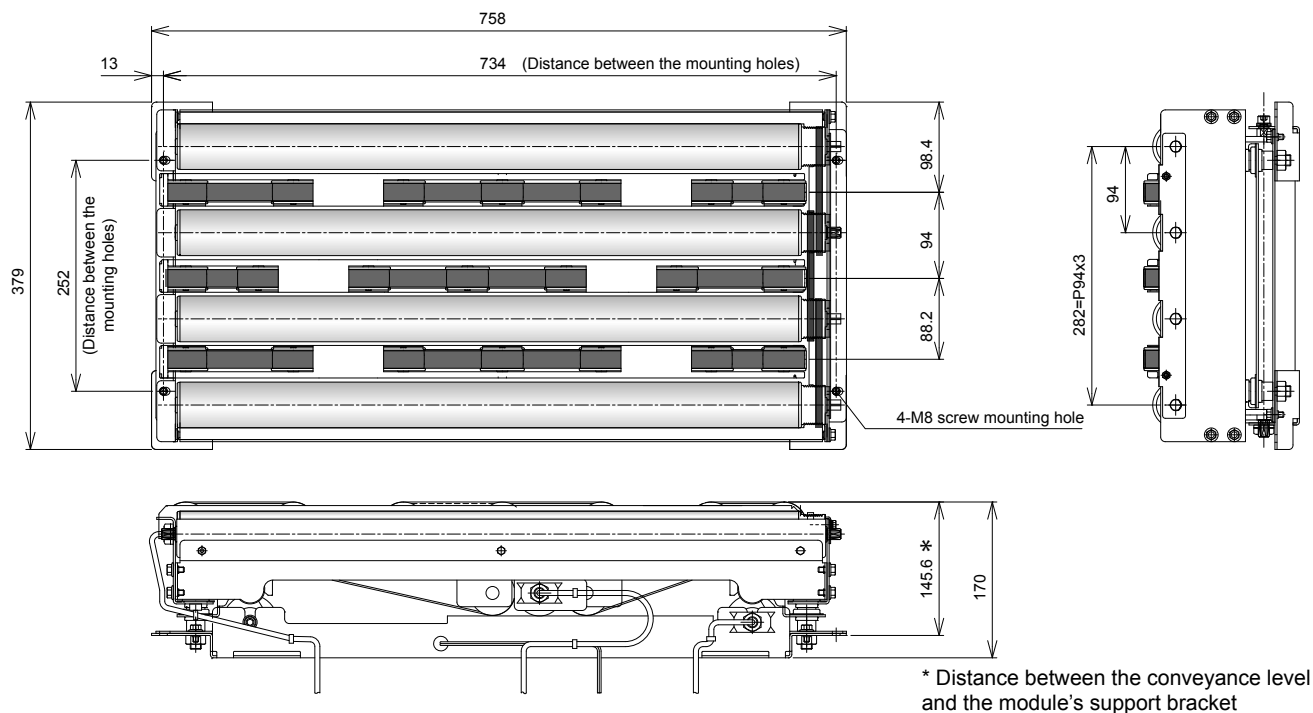
**!** Insertion of the F-RAT-S300 must be planned in such a way that it can be easily inserted or removed for maintenance purposes.

## DIMENSIONS

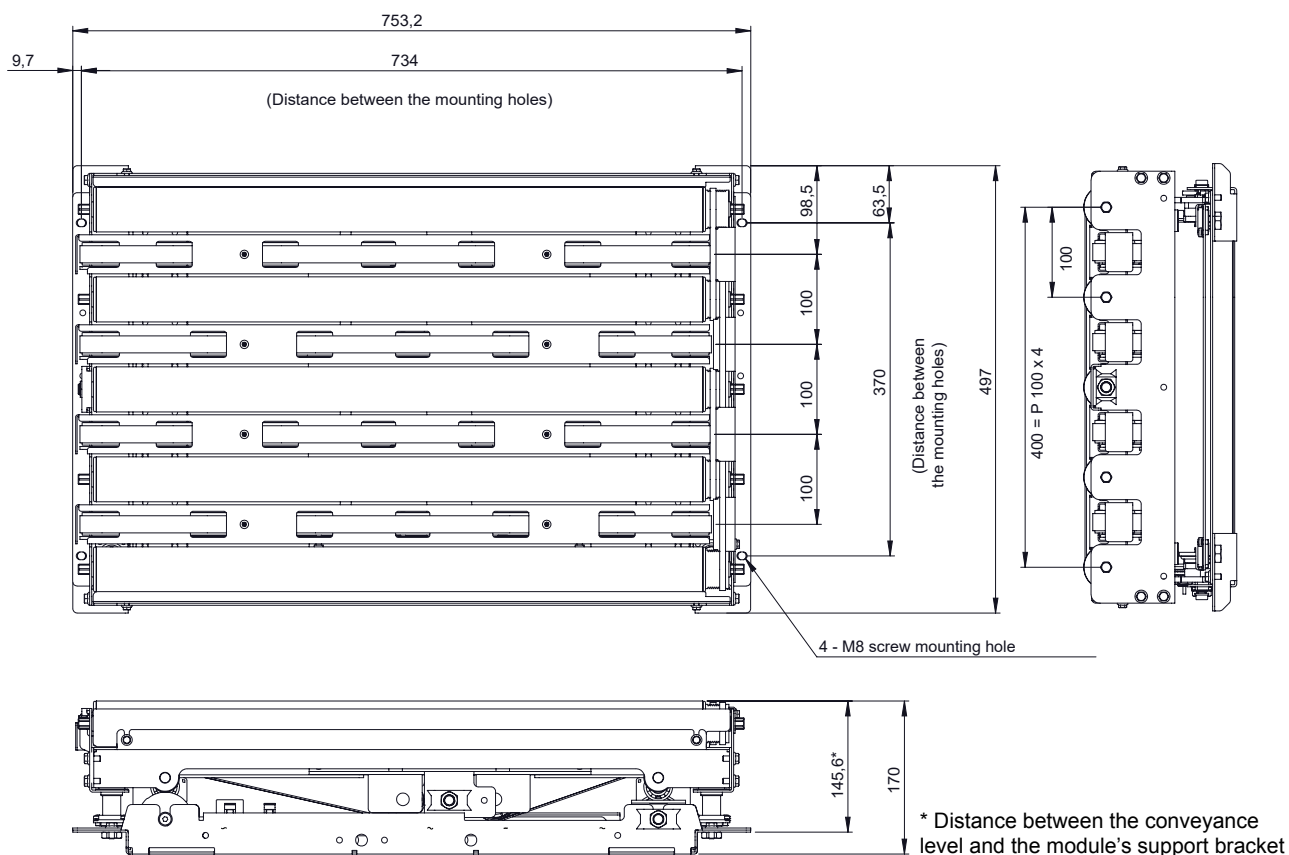
■ **Size A - L : 379mm x l : 758mm**



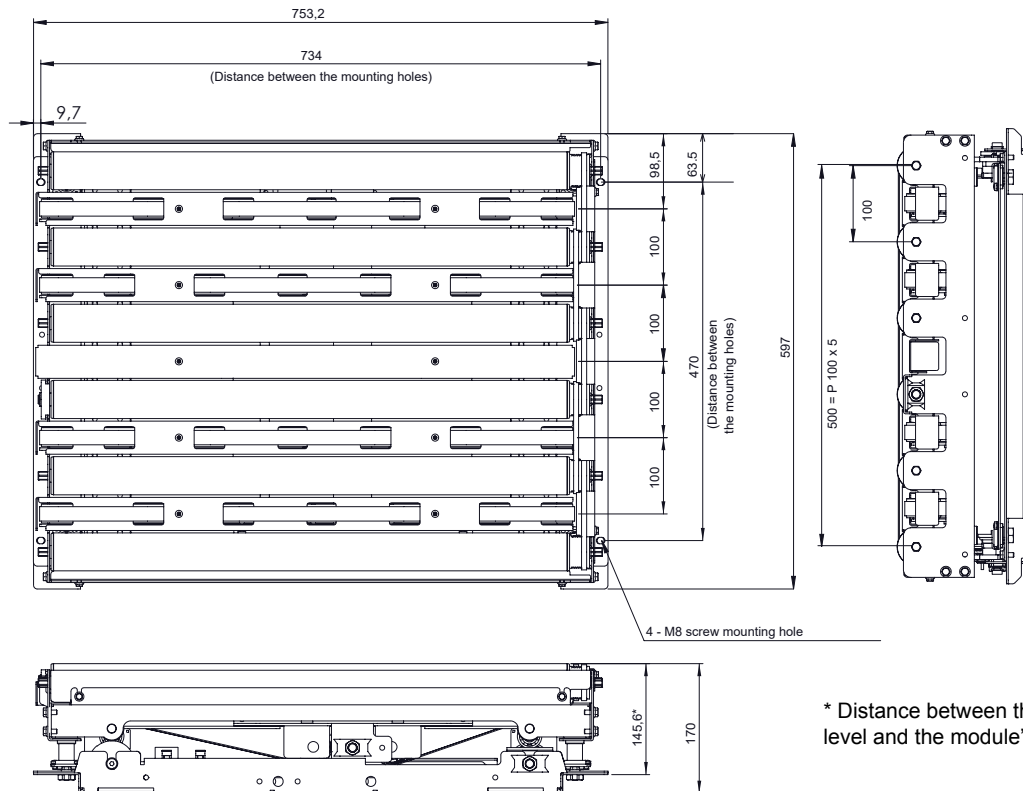
This size is only available for the FE motorisation version.



■ **Size B - L : 497mm x l : 753,2mm**



■ **Size C - 4 flat belts - L : 597mm x l : 753,2mm**

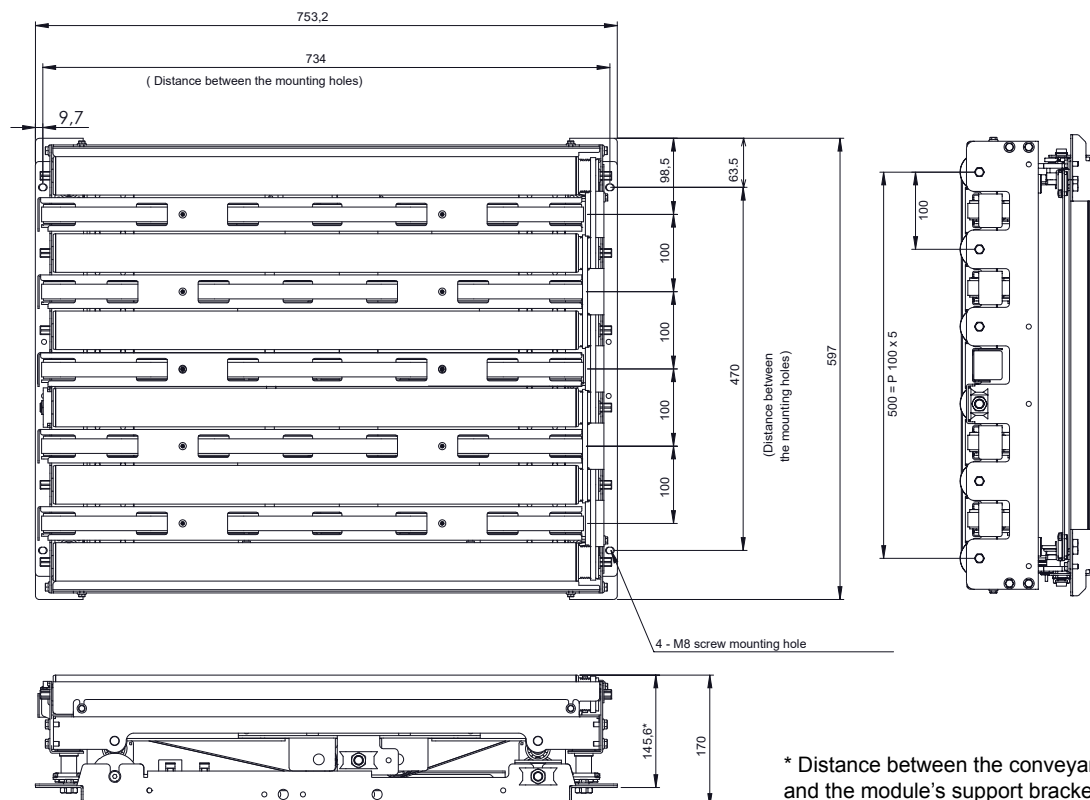


\* Distance between the conveyance level and the module's support bracket

■ **Size C - 5 flat belts (option for FE only) - L : 597mm x l : 753,2mm**

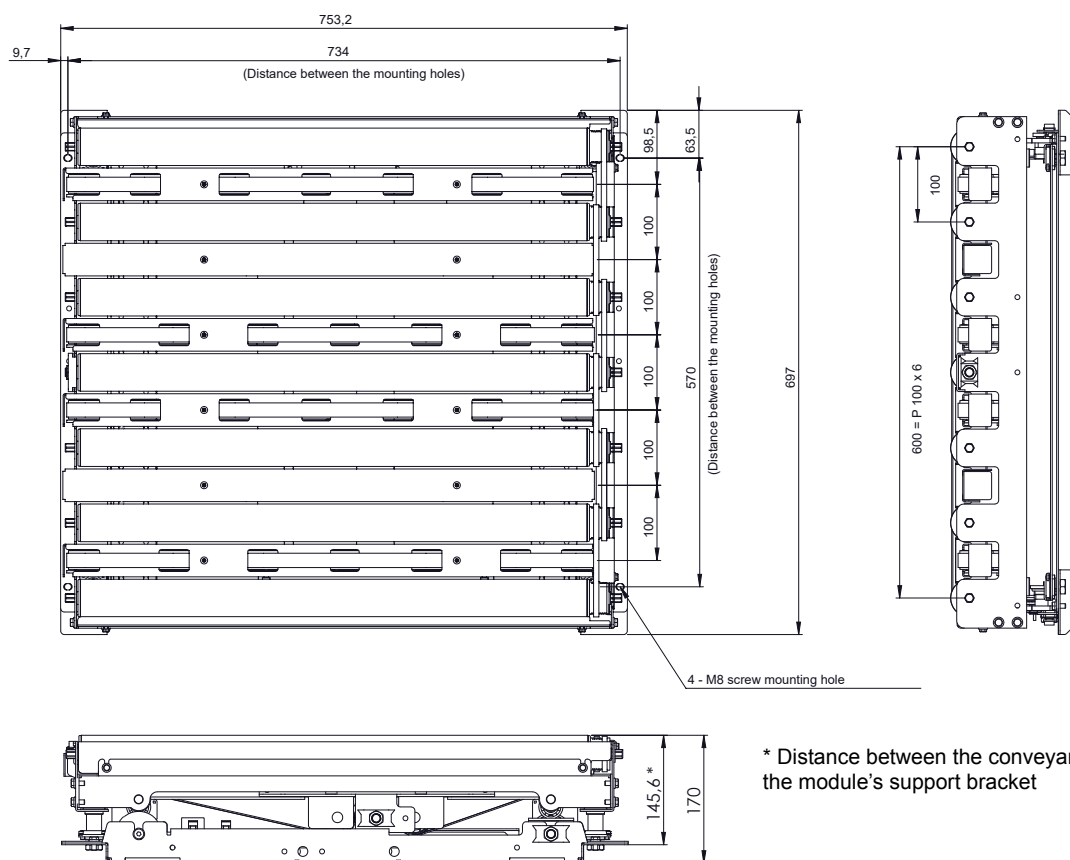


 Please consult with us.



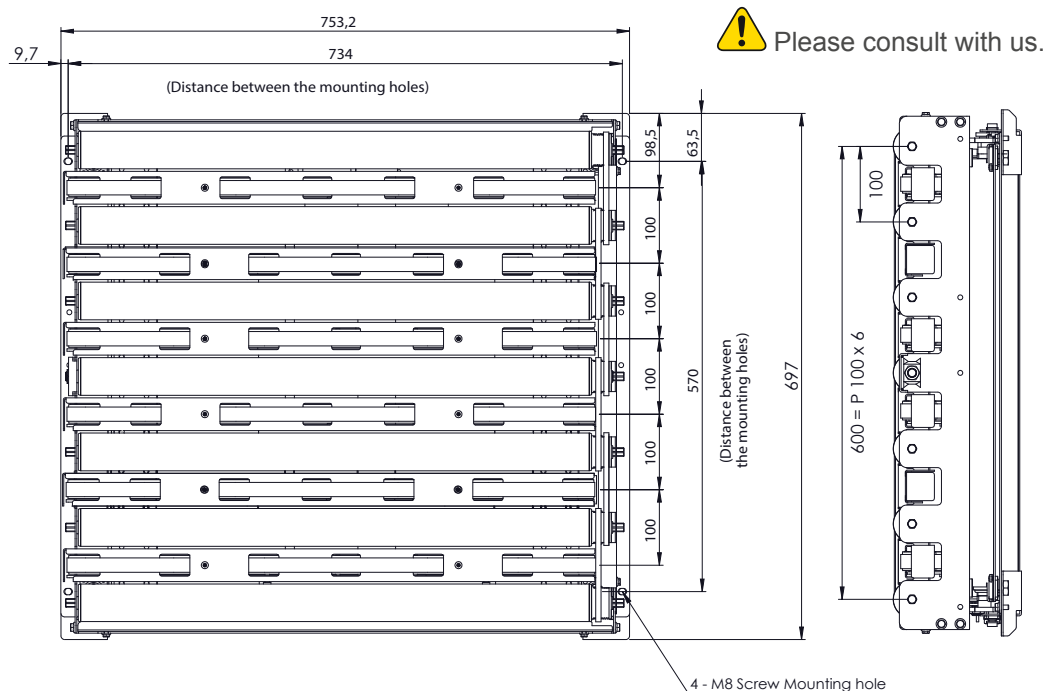
\* Distance between the conveyance level and the module's support bracket

■ **Size D - 4 flat belts - L : 697mm x l : 753,2mm**



\* Distance between the conveyance level and the module's support bracket

■ **Size D - 6 flat belts (option for FE only) - L : 697mm x l : 753,2mm**



\* Distance between the conveyance level and the module's support bracket

## 5. F-RAT-S300 CONTROL

### 24VDC POWER SUPPLY (OPTIONAL)

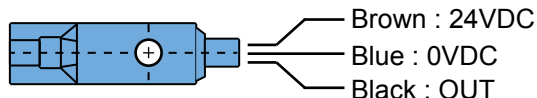


A 24VDC switching power supply, which can accept an overcurrent of 120-150% for 3 ~ 5s, is recommended to optimize the power supply compared to the number of motorized rollers to be controlled.

| Reference | Input            | Output  | Power | Start-up boost |
|-----------|------------------|---------|-------|----------------|
| CT-10-241 | 380~480V<br>3 ph | 24V-10A | 240W  | 120%           |
| QT-20-241 |                  | 24V-20A | 480W  | 150%           |
| QT-40-241 |                  | 24V-40A | 960W  | 150%           |

- Very low inrush current.

### WIRING AND CHARACTERISTICS OF SN-R / SN-S SENSORS



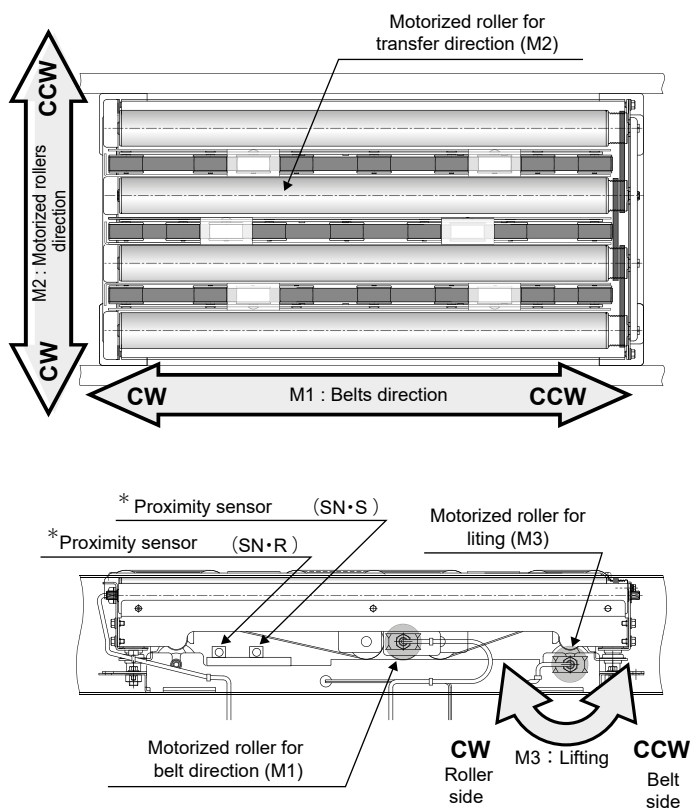
| Model            | GX-H12A-P (PANASONIC)                                                   |
|------------------|-------------------------------------------------------------------------|
| Supply voltage   | 12~24 VDC +10-15%                                                       |
| Absorbed current | ≤15mA                                                                   |
| Output signal    | Current max : 100mA<br>Open collector<br>PNP normally open contact (NO) |

### STATE OF THE SENSORS AND TRANSFER TABLE POSITIONS

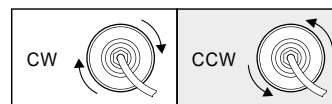
It must be ensured that the sensor states correspond to the position of the transfer rollers and the flat belts.

| Proximity sensor for belt direction (SN.S) | Proximity sensor for transfer direction (SN.R) | Position of the rollers / belts                                                                                          |
|--------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| ON                                         | OFF                                            | Belts in high position              |
| OFF                                        | ON                                             | Rollers in high position            |
| OFF                                        | OFF                                            | Belts and rollers in high position  |

## DIRECTION OF ROTATION OF MOTORIZED ROLLERS AND TRANSFER TABLE MOVEMENT



Direction rotation of motorized roller  
Cable side view



## MOTORIZED ROLLERS CONTROL

F-RAT-S300 is motorized, either with 3 x PM500FE series motorized rollers with the associated circuit board, or with 3 x PM500XP series with integrated circuit board.

|               | Motorized roller for belt (M1)                | Motorized roller for slave roller (M2) | Motorized roller for lifting (M3) |
|---------------|-----------------------------------------------|----------------------------------------|-----------------------------------|
| PM500FE serie | PM500FE060 x2 ; PM500FE017 x1 with HBR-605 x1 |                                        |                                   |
|               | PM500FE060 x1 with CBM-105 x1                 | PM500FE060 x1 with CBM-105 x1          | PM500FE017 x1 with CBR-306 x1     |
| PM500XP serie | PM500XP060 x1                                 | PM500XP060 x1                          | PM500XP017 x1                     |

## F-RAT-S300 CONTROL WITH PM500FE MOTORIZED ROLLERS

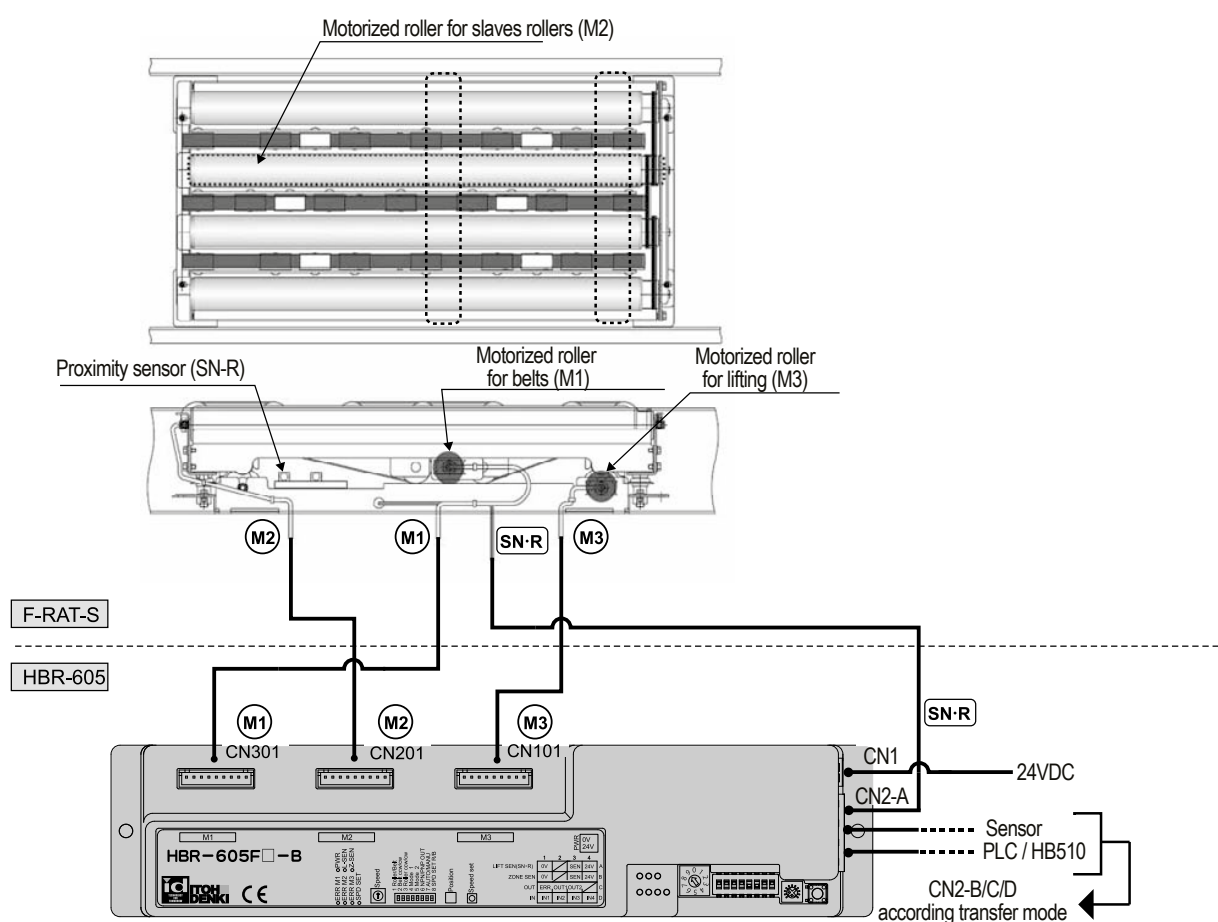
To order the motorized rollers M1, M2 and M3, there are 2 possibilities:

- With an HBR-605 circuit board that controls the 3 motorized rollers
- With the CBM-105 and CBR-306 circuit boards to individually control each motorized roller

### HBR-605 circuit board

A HBR-605 circuit board allows to control the 3 motorized rollers and to control F-RAT-S300 movements according to the desired transfer mode, by simplifying the programming of the transfer management, the wiring and ensures a smooth and silent movement of the transfer table (motor stop M3 for lifting).

Consult the HBR-605 technical documentation.

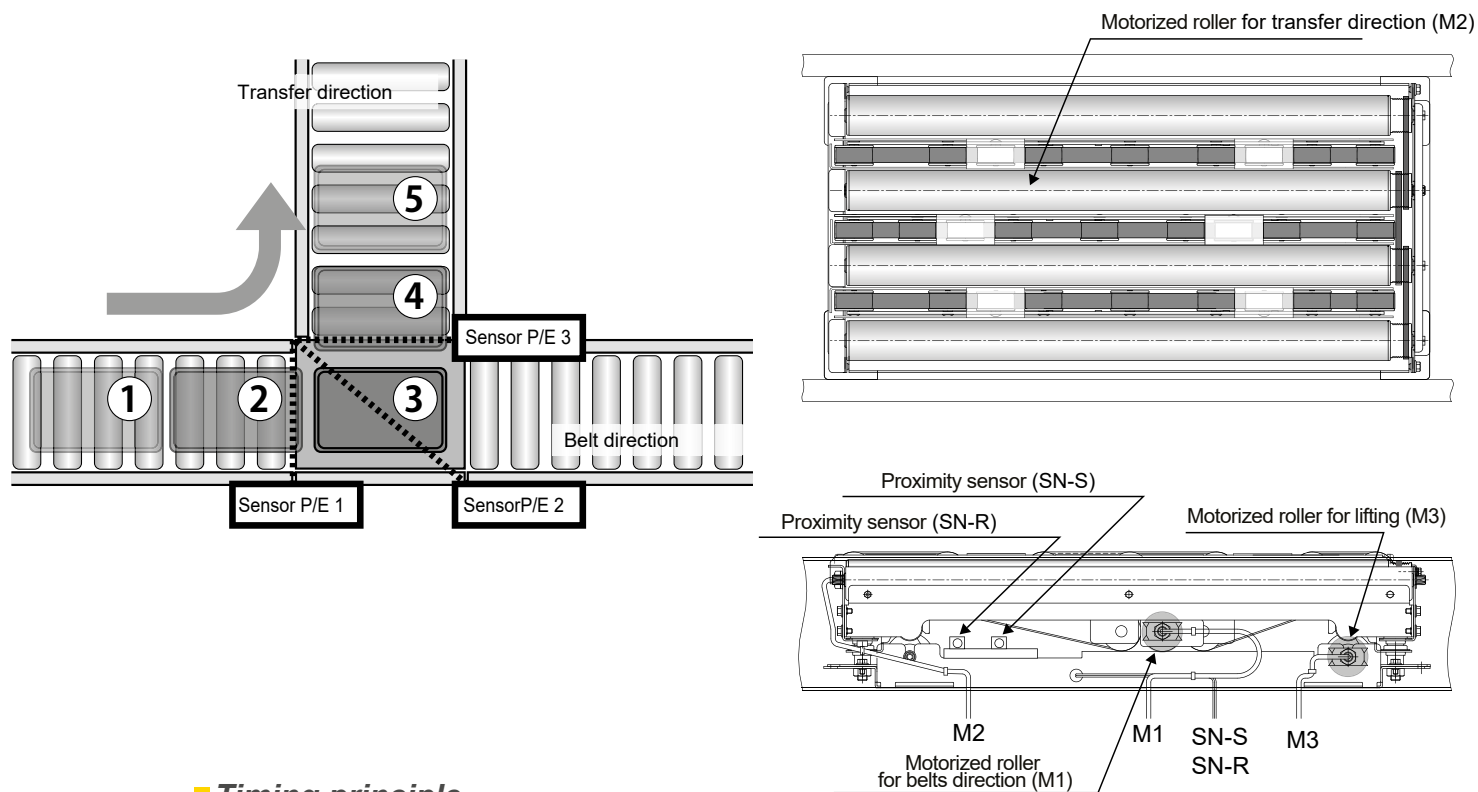


## ■ CBM-105 and CBR-306 circuit boards

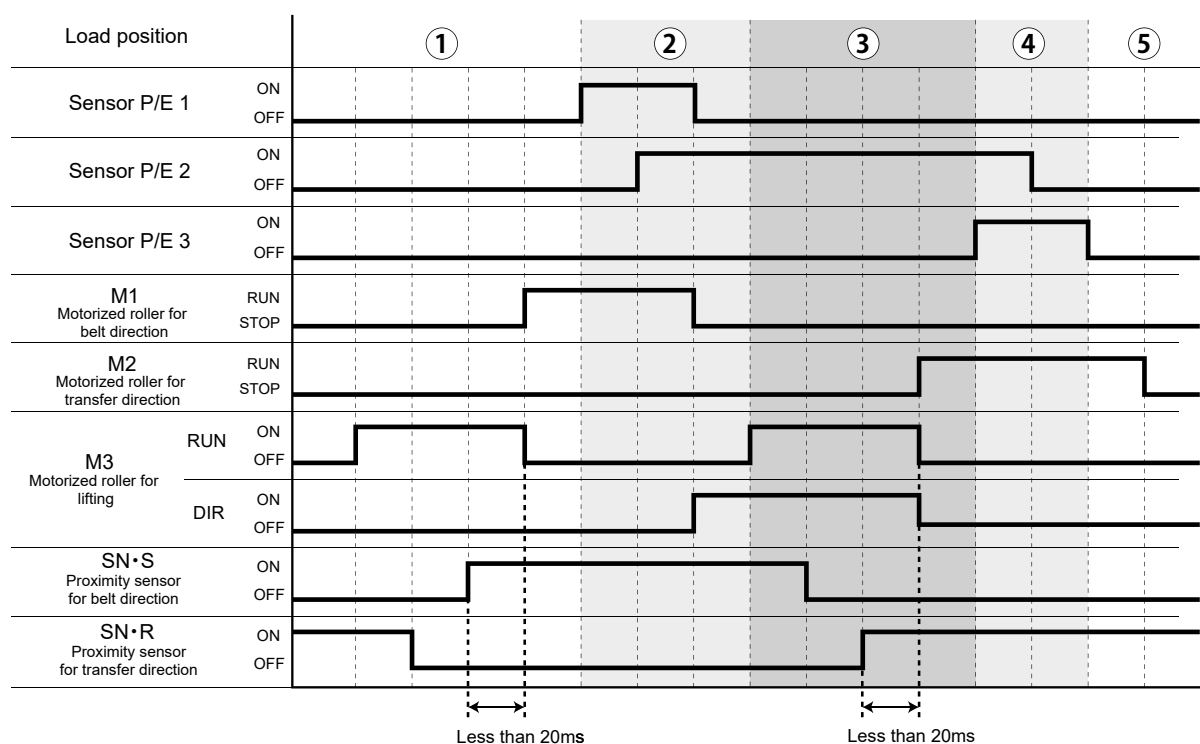
2x CBM-105 is used to control 1 motorized roller for the belt direction (M1) and 1 other motorized roller for the transfer direction (M2).

1x CBR-306 controls the motorized roller for lifting and manage the up / down movement with the pulse signal.

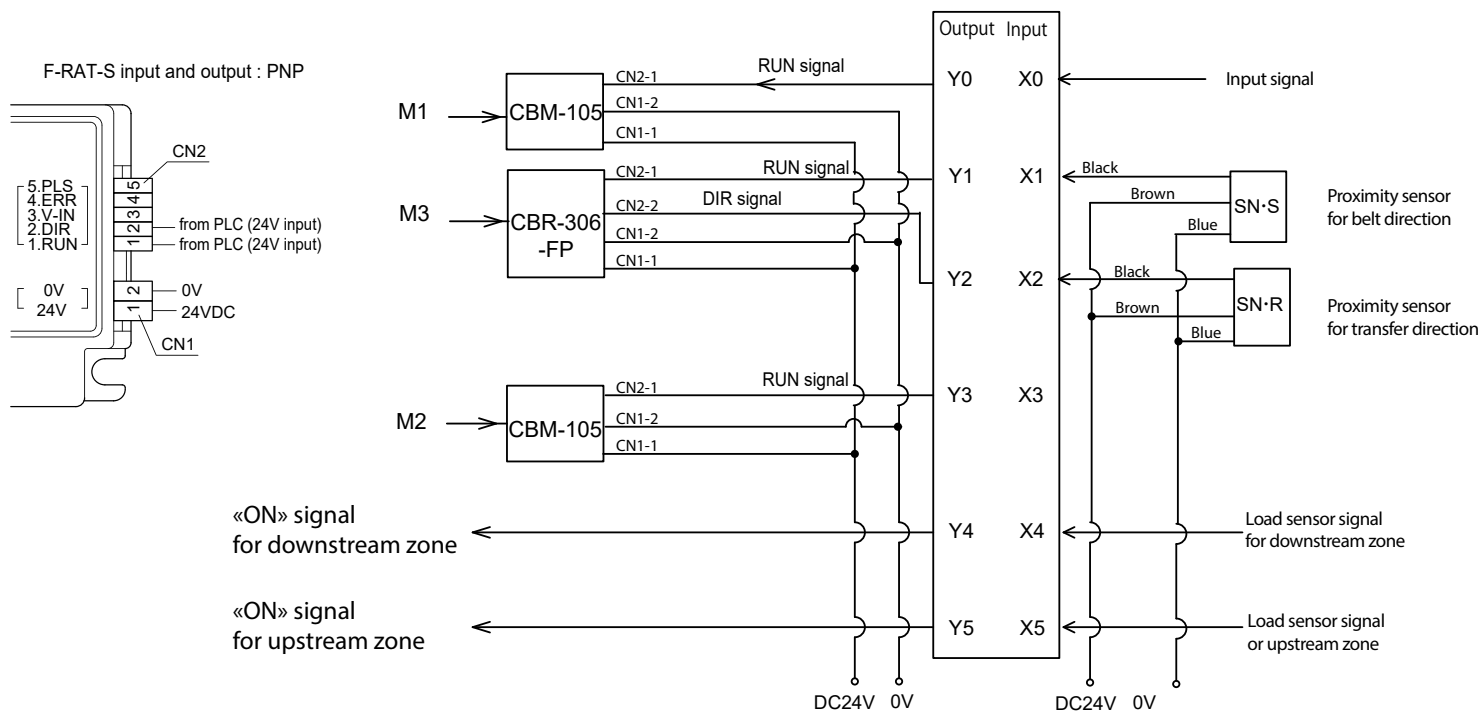
Consult CBM-105 and CBR-306 technical documentation.



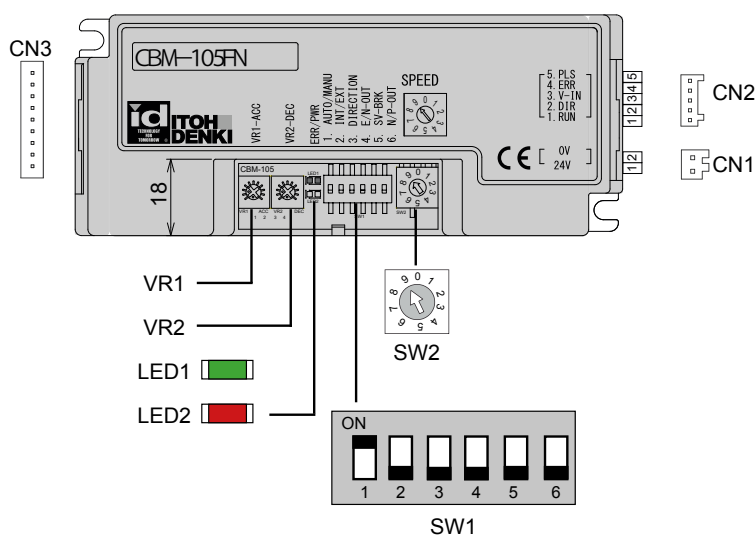
## ■ Timing principle



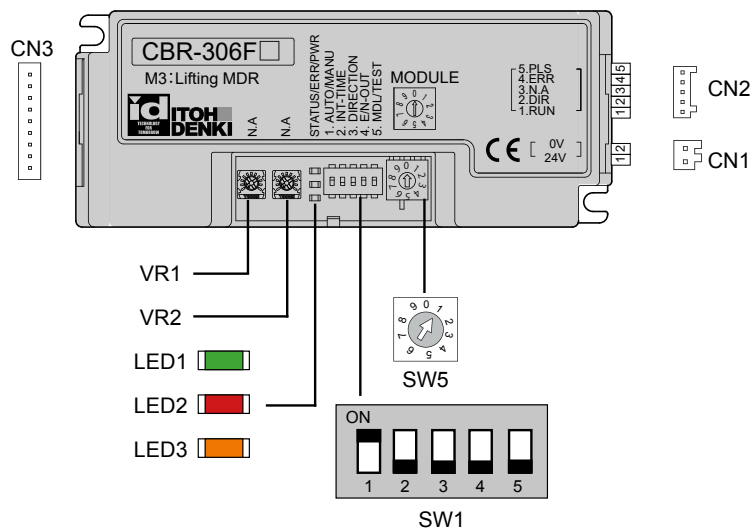
## ■ Connection diagram



### CBM-105

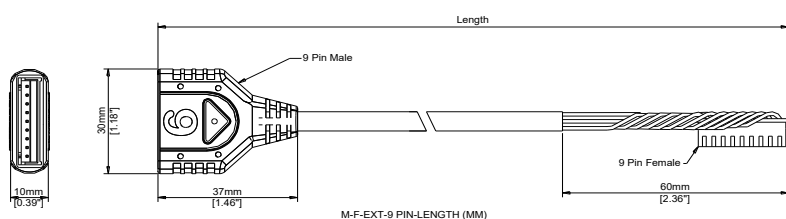


### CBR-306



**!** Set the CBR-306 switch 5 to 1. If that is not the case, this can cause a malfunction.

## ■ Extension cables for PM500FE and CBM-105 / CBR-306 - Male / Female - 9 pins



| Length | Extension cable reference |
|--------|---------------------------|
| 1200mm | ACE-CBM-B1200             |

## ■ Speed adjustment for transfer belt (M1) and roller (M2)

➔ By SW1 and SW2 on the CBM105-FP1-EU1 control panel

STEADY NO LOAD SPEED SELECTION



SW1 (1 - ON)

SW2



SW1 (1 - OFF)



SW2

| SW2 | Code 60 |
|-----|---------|
| 9   | 53,5    |
| 8   | 53,5    |
| 7   | 53,5    |
| 6   | 51,4    |
| 5   | 47,3    |
| 4   | 46,3    |
| 3   | 41,1    |
| 2   | 38,6    |
| 1   | 26      |
| 0   | 33,4    |

| SW2 | Code 60 |
|-----|---------|
| 9   | 30,9    |
| 8   | 28,3    |
| 7   | 25,7    |
| 6   | 23,1    |
| 5   | 20,6    |
| 4   | 18      |
| 3   | 15,4    |
| 2   | 12,9    |
| 1   | 10,3    |
| 0   | 7,7     |

⚠ Set the CBR-306 switch 5 to 1. If that is not the case, this can cause a malfunction.

➔ By external voltage of 0-10 V

VOLTAGE CHANGE ON TERMINAL 3 OF CN2



SW1 (2 - ON) + connector CN2-3

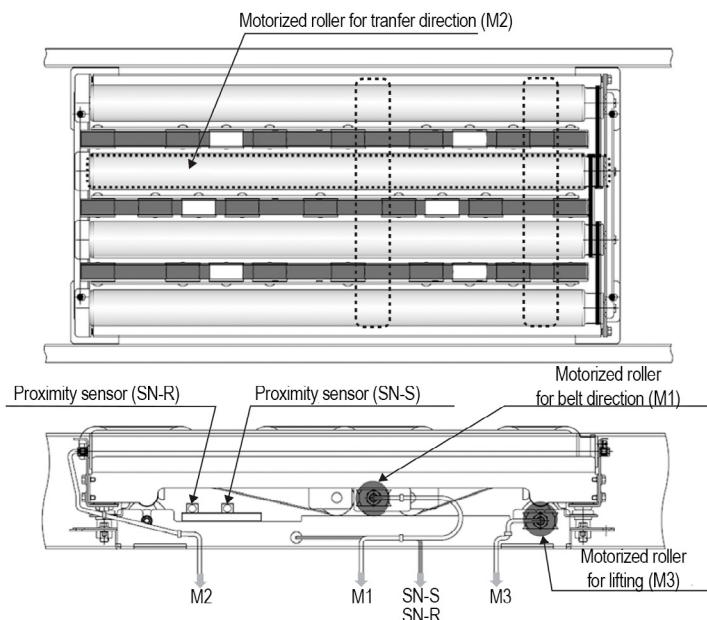
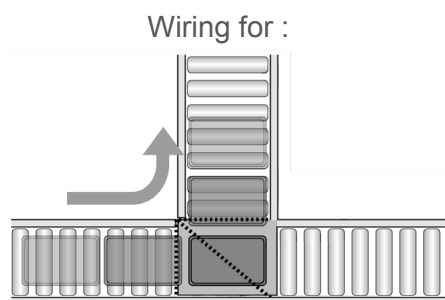
| Tension (V) | Speed<br>No load - Code 60 |
|-------------|----------------------------|
| 9,75±0,2    | 53,5                       |
| 9,25±0,2    | 53,5                       |
| 8,75±0,2    | 53,5                       |
| 8,25±0,2    | 51,4                       |
| 7,75±0,2    | 47,3                       |
| 7,25±0,2    | 46,3                       |
| 6,75±0,2    | 41,1                       |
| 6,25±0,2    | 38,6                       |
| 5,75±0,2    | 36,0                       |
| 5,25±0,2    | 33,4                       |
| 4,75±0,2    | 30,9                       |
| 4,25±0,2    | 28,3                       |
| 3,75±0,2    | 25,7                       |
| 3,25±0,2    | 23,1                       |
| 2,75±0,2    | 20,6                       |
| 2,25±0,2    | 18,0                       |
| 1,75±0,2    | 15,4                       |
| 1,25±0,2    | 12,9                       |
| 0,75±0,2    | 10,3                       |
| 0,25±0,2    | 7,7                        |

⚠ Set the CBR-306 switch 5 to 1. If that is not the case, this can cause a malfunction.

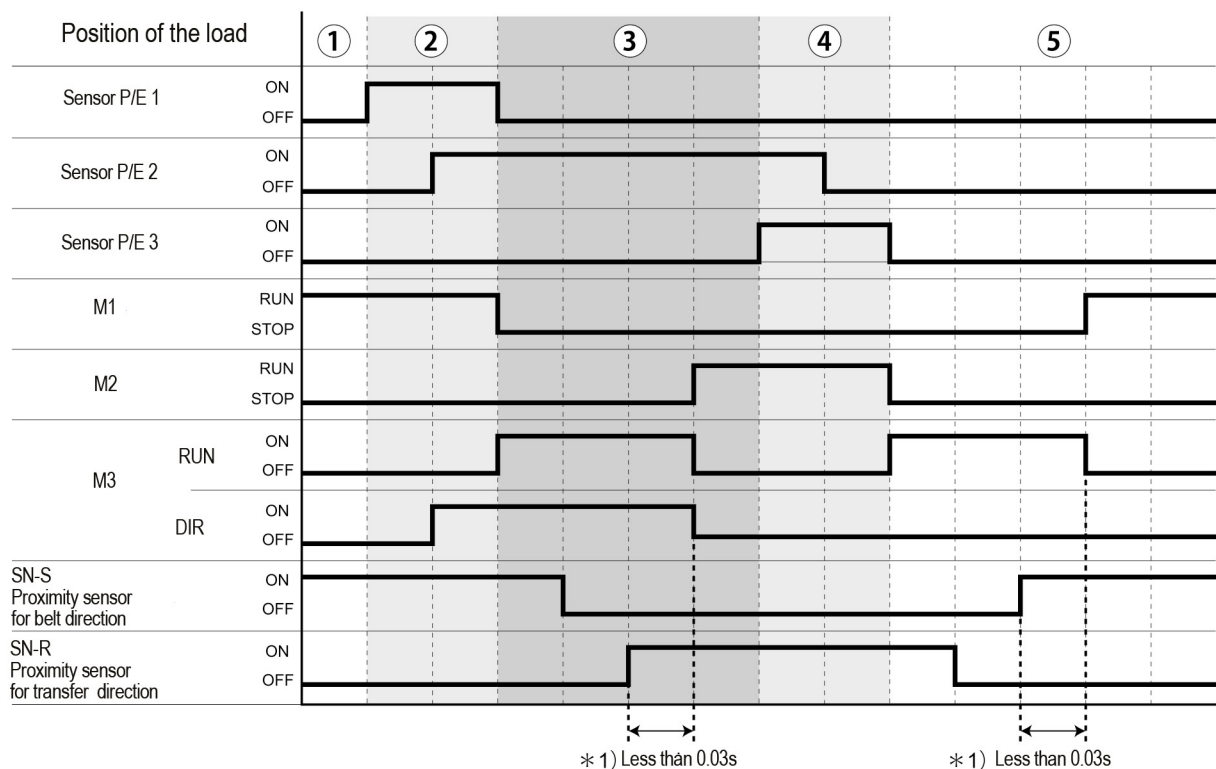
⚠ The 0 V of the power supplies must be connected together.

## F-RAT-S300 CONTROL WITH PM500XP MOTORIZED ROLLERS

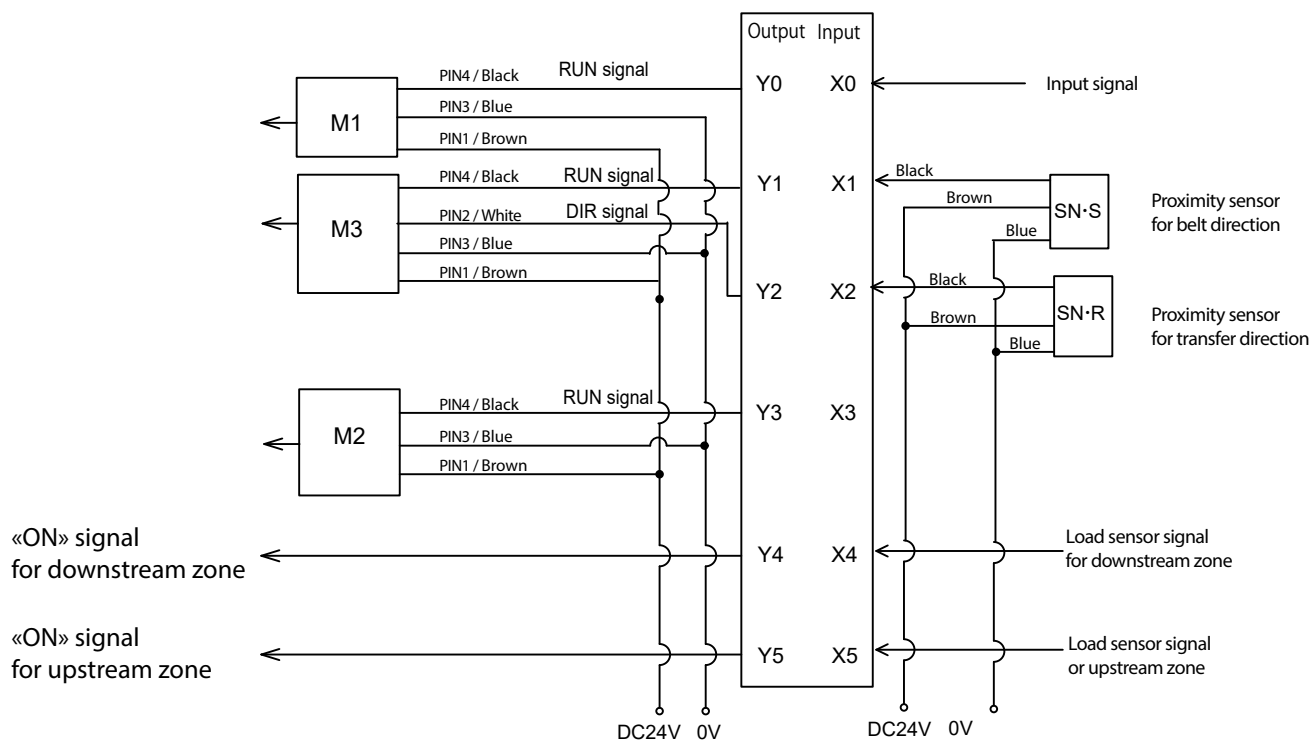
F-RAT-S300 is motorized with standard 2xPM500XP for belt direction (M1) and transfer direction (M2) and 1xPM500XP for lifting (M3) specifically programmed to secure the up-down movement.



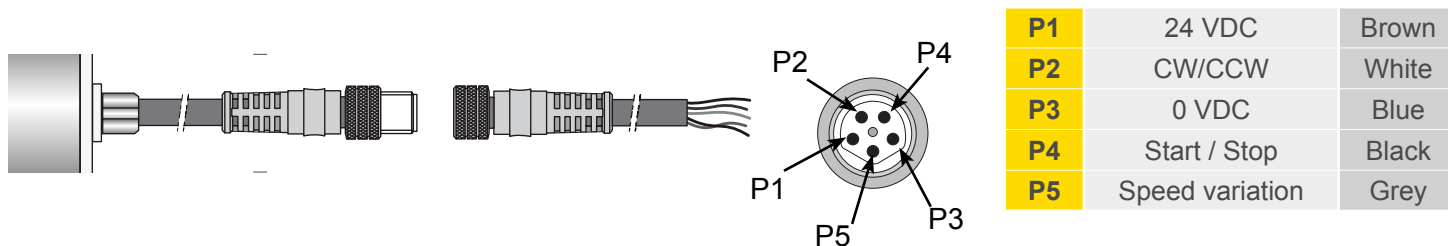
### Timing principle



## ■ Connection diagram

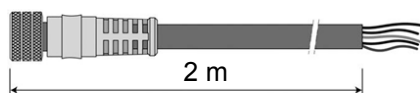


To connect a motorized roller of the PM500XP series, it is necessary to use an M8 - 5 pins female connector:



## ■ Extension cable

Extension cable with connector M8x5 pins – 2 meters



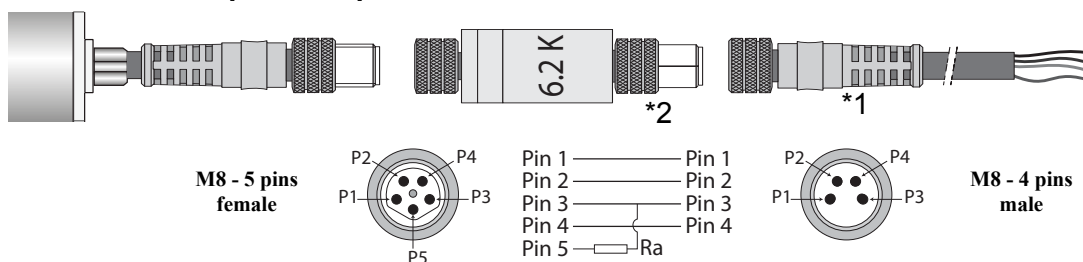
| Length | Extension cable reference |
|--------|---------------------------|
| 2m     | 405000P02M020             |

## ■ Speed adjustment for motorized roller for belt (M1) and transfer roller (M2)

### ➔ By external voltage on pin no. 5

| External voltage (V) | Code 60 m/min |
|----------------------|---------------|
| 9,3-10               | 61,7          |
| 8,5±0,2              | 56,6          |
| 7,5±0,2              | 46,3          |
| 6,5±0,2              | 41,2          |
| 5,5±0,2              | 36,0          |
| 4,5±0,2              | 30,9          |
| 3,5±0,2              | 25,0          |
| 2,5±0,2              | 20,6          |
| 1,5±0,2              | 15,4          |
| 0-0,9                | 10,3          |

### ➔ With speed adaptor



| Ref                  | Ra (K ohm) | Code 60m/min |
|----------------------|------------|--------------|
| Speed adaptator (*2) |            |              |
| n/a                  |            | 61,7         |
| BG20342-6k2          | 6,2        | 56,6         |
| BG20342-4k3          | 4,3        | 46,3         |
| BG20342-3k3          | 3,3        | 41,2         |
| BG20342-2k2          | 2,2        | 36,0         |
| BG20342-1k8          | 1,8        | 30,9         |
| BG20342-1k2          | 1,2        | 25,0         |
| BG20342-750          | 0,75       | 20,6         |
| BG20342-430          | 0,43       | 15,4         |
| Link                 |            | 10,3         |

\*1 2-metres cable with M8-5p female connector  
Ref : 405000P02M020

\*2 Speed adaptator (option)

## 6. REFERENCES OF PRODUCT

### F – RAT – S [ 1 ] [ 2 ] – [ 3 ] [ 4 ] [ 5 ] - [ 6 ] [ 7 ] [ 8 ]

#### [ 1 ] SPEED

60 ... 60 m/min (Belt / Transfer : 60 m/min)

#### [ 2 ] SIGNAL TYPE SELECTION

N ... NPN (Sensor / Circuit board)

P ... PNP (Sensor / Circuit board)

#### [ 3 ] DIMENSIONS

A ... W 379 x L 758 mm

B ... W 497 x L 753,2 mm

C ... W 597 x L 753,2 mm

D ... W 697 x L 753,2 mm

#### [ 4 ] NUMBER OF FLAT BELTS

3 ... 3 belts

4 ... 4 belts

5 ... 5 belts

6 ... 6 belts

#### [ 5 ] WITH OR WITHOUT BELT CASSETTE COVER

P ... With cover

#### [ 6 ] TYPE OF MOTOR

F ... PM500FE Serie

X ... PM500XP Serie

#### [ 7 ] SURFACE COATING ON TUBE, ANTISTATIC VERSION

0... Zinc-coated steel

P... PVC sleeve

N... Natural rubber

U... Polyurethan

A... Anti-static version

#### [ 8 ] VARIANT INDEX

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

*Exemple :*

*F-RAT-S60P-B4P-F02*

*(Speed code 60m/min, PNP, 497x753,2mm; 4 belts with protection, PM500FE motorized roller, Zinc-coated steel roller, variant 2).*

| Module size          | Size A                          | Size B             | Size C              | Size D              |
|----------------------|---------------------------------|--------------------|---------------------|---------------------|
|                      | Standard model                  |                    |                     |                     |
| Number of flat belt  | 3                               | 4                  | 4                   | 4                   |
| Motorized by PM500FE | F-RAT-S60P-A3P-F02              | F-RAT-S60P-B4P-F03 | F-RAT-S60P-C4P-F03  | F-RAT-S60P-D4P-F03  |
| Motorized by PM500XP | NA                              | F-RAT-S60P-B4P-X04 | F-RAT-S60P-C4P-X04  | F-RAT-S60P-D4P-X04  |
|                      | Model with flat belt supplement |                    |                     |                     |
| Number of flat belt  |                                 |                    | 5                   | 6                   |
| Motorized by PM500FE | NA                              | NA                 | F-RAT-S60P-C5P-F03* | F-RAT-S60P-D6P-F03* |
| Motorized by PM500XP | NA                              | NA                 | NA                  | NA                  |

\* Please consult with us.

## ▶ ANNEX 1

### INCORPORATION DECLARATION

#### The manufacturer:

ITOH DENKI CO., Ltd  
1146-2 Asazuma-Cho, Kasai, Hyogo 679-0105 Japan

#### Distributed in Europe by :

ITOH DENKI Europe SAS  
490 avenue des Jourdiés - PAE les Jourdiés - BP 323  
74807 St Pierre en Faucigny Cedex - France

#### hereby declares that the product series :

#### 90° TRANSFER MODUL F-RAT-S300

is an incomplete machine as defined in the EC Machinery Directive and therefore does not fully meet the requirements of this Directive. Commissioning is prohibited until the whole machine/system in which it is incorporated is declared to be in compliance with the EC Machinery Directive

Person authorized to compile the technical documentation :

ITOH DENKI CO., Ltd  
Toshiyuki TACHIBANA  
1146-2 Asazuma-Cho, Kasai, Hyogo 679-0105 Japan

ITOH DENKI EUROPE SAS  
Masayuki SHIMODA  
490 Avenue des Jourdiés, 74800 St Pierre en Faucigny - France

#### EC Directives applied :

- European EMC Directive 2014/30/EC
- European RoHS Directive 2011/65/EU

ITOH DENKI EUROPE SAS, undertakes to forward, following a duly motivated request from the national authorities, the relevant information concerning the quasi-machine.

Saint Pierre en Faucigny, 19 July 2021

T. AKASHI, General Director





Technology for tomorrow



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## ITOHDENKI EUROPE S.A.S.

490 Av. des Jourdiés - P.A.E. les Jourdiés

74800 St Pierre en Faucigny - France

Phone : +33 (0)4 50 03 09 99 Fax : +33 (0)4 50 03 07 60

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[www.itoh-denki.com](http://www.itoh-denki.com)