

INSTRUCTIONS: STAR PLUS

Date: 06-05-2008 Check: 03



**DYNATECH
DYNAMICS AND TECHNOLOGY, S.L.**

**OVERSPEED GOVERNOR
STAR PLUS**

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1 INTRODUCTION.

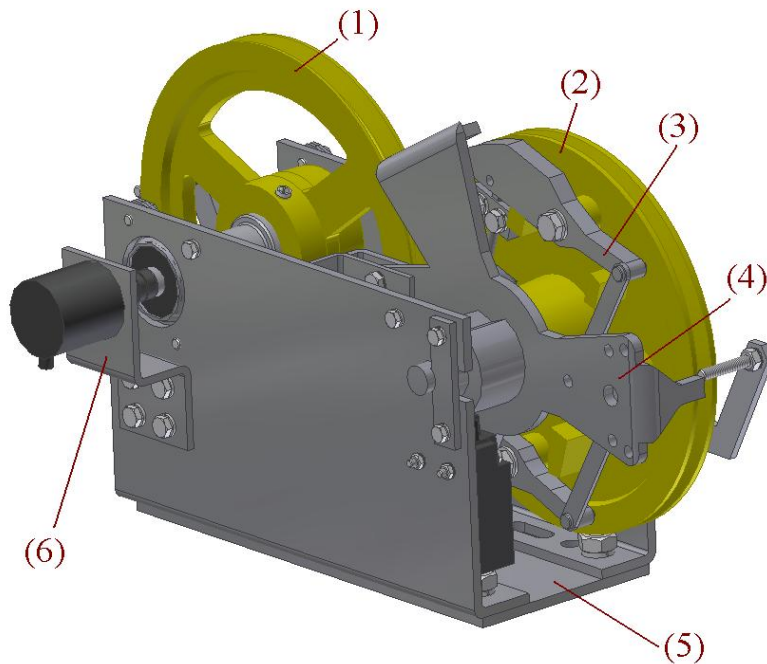
The STAR Plus speed governor is a type of STAR speed governor that moves at the same time as the lift car.

The main feature of this speed governor lies in the fact that it can be coupled to an Encoder so that the position of the lift is indicated at all times.

2 MAIN COMPONENTS.

Each speed governor is made up of the following main parts: two pulleys, one centrifuge system, one blocking part, casing and a part connecting the speed governor to the car or frame.

Below is an image showing the speed governor unit:



Where:

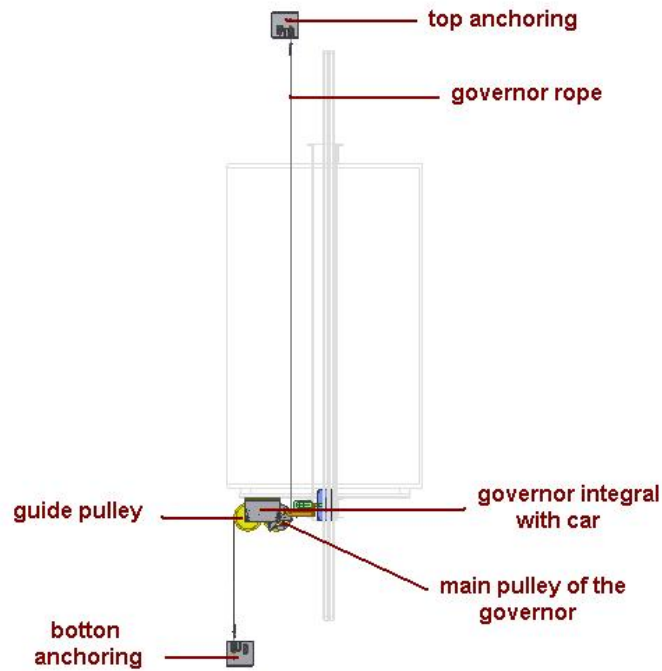
- (1) – Guide Pulley.
- (2) – Main Pulley.
- (3) – Centrifugal system.
- (4) – Locking system.
- (5) – Car or sling fixing plate.
- (6) – Encoder

3 WORKING PRINCIPLES.

The governor is of the centrifugal type, and is able to work either **upwards** or **downwards**.

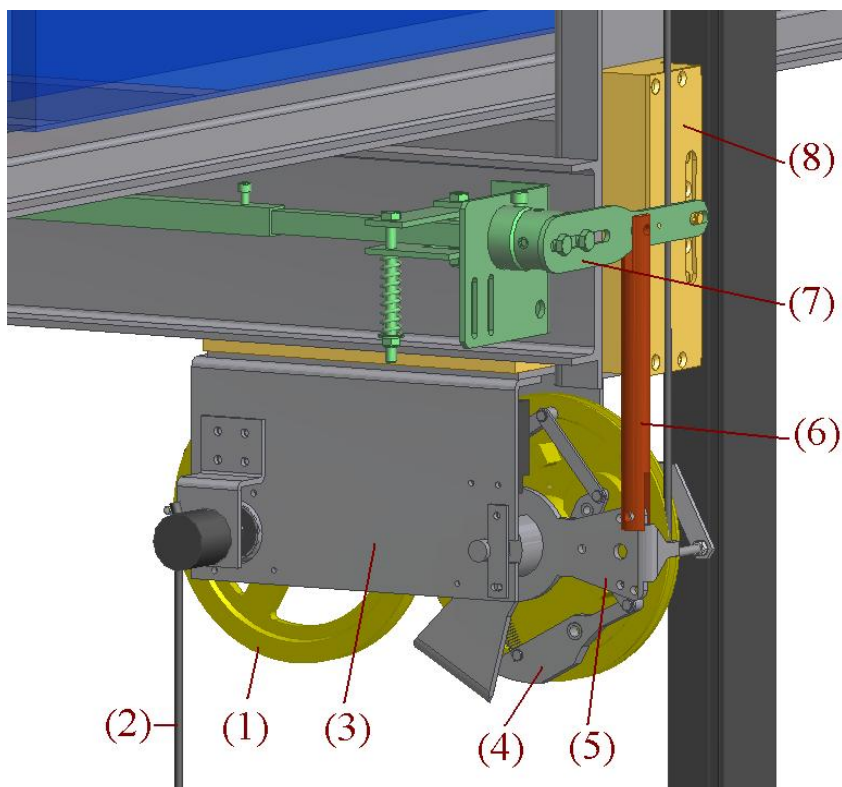
As it was mentioned above, the designed object is fixed on the car or on the sling of the lift, and it can be placed either above or below both. The rope, anchored to the ceiling and to the pit floor, passes through the governor, along the pulley jaws. In this way, when the car reaches the tripping speed, the rope-governor relative movement will lock it. This governor locking will drive the safety gear and will stop the car movement.

Working diagram is as follows:



Like the STAR speed governor, the STAR plus can be fitted in several different ways.

Below is an example of how the speed governor can be fitted on the car. The diagram shown below shows the speed governor underneath the lift car.

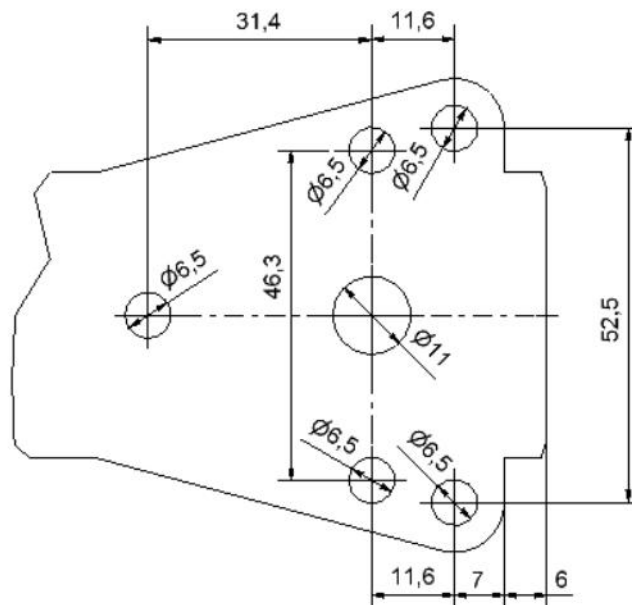


Where:

- (1) – Guide pulley.
- (2) – Rope.
- (3) – Governor.
- (4) – Centrifugal system.
- (5) – Locking device.
- (6) – Auxiliary system.
- (7) – Driving bar.
- (8) – Safety gear.

Bearing in mind that the governor position in the car depends on the customer's design, the auxiliary system coupling the governor to the driving bar must be made by the lift manufacturer.

Below is attached, an enlarged drawing of the five anchoring drills of the auxiliary system to the locking device.



The guide pulley is used to re-divert the rope towards the tensor placed in the pit. This pulley rotates whenever there is any movement in the car, even when the main pulley is locked. That is why we can assure that the pulley follows the car movement perfectly.

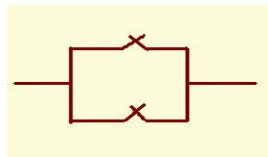
This fact is very important because it allows to know the position of the lift at every moment, by means of mounting an Encoder in the pulley.

Another important part of the Governor set is the rope tensing system. Below, the workings are briefly explained.

3.1 ROPE TENSING SYSTEM.

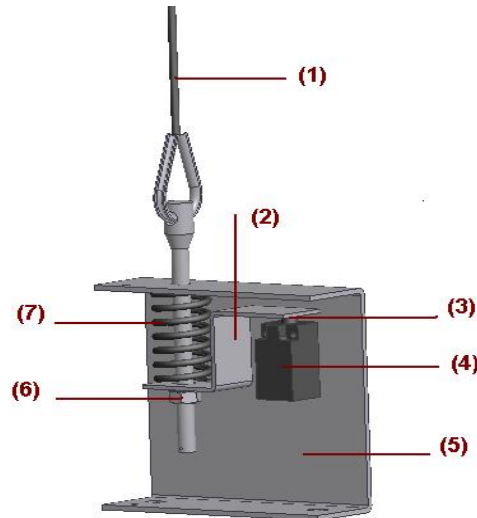
The rope is anchored to the pit and to the ceiling of the lift well by means of a tensing spring system, in such a way that neither weight nor guide pulley are necessary in the pit.

The “detensing contacts” will be placed together. This contacts must be connected in parallel and, in turn, to the installation security series line.



The aim of the two contacts is to detect a rope breakage or detensing, as, in such a case, both springs will drive the contacts. In case of wedging, one of the springs will loosen and the other will tighten. As a result, therefore, only one of the two contacts will open without modifying the series line.

Below, a picture of a pit tensing device is shown:



Where:

- (1) - Rope.
- (2) – Driving plate.
- (3) – Contact point.
- (4) – Detensing contact.
- (5) – Bearing plate.
- (6) – Adjusting nut.
- (7) – Tensing spring.

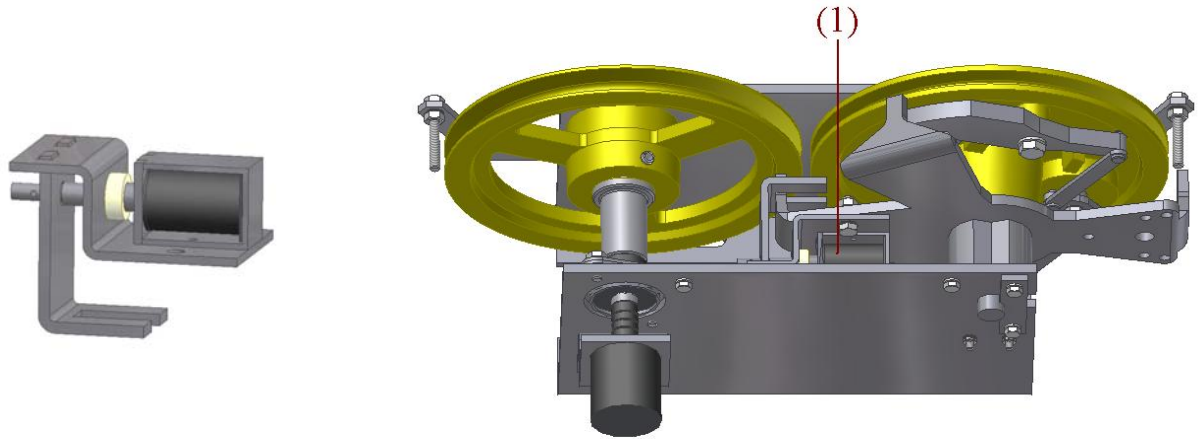
** The Star Plus Tension device is the same as that of the Star. For further information on the tightening process, please consult the Star speed governor manual.*

3.2 REMOTE TRIPPING SYSTEM.

The governor has a built-in remote tripping system to check the correct interlocking of the governor and the subsequent safety gear wedging.

Basically, it consists of a remote interlocking electromagnetic system, which can be driven from the engine room. In order to help during the installation:

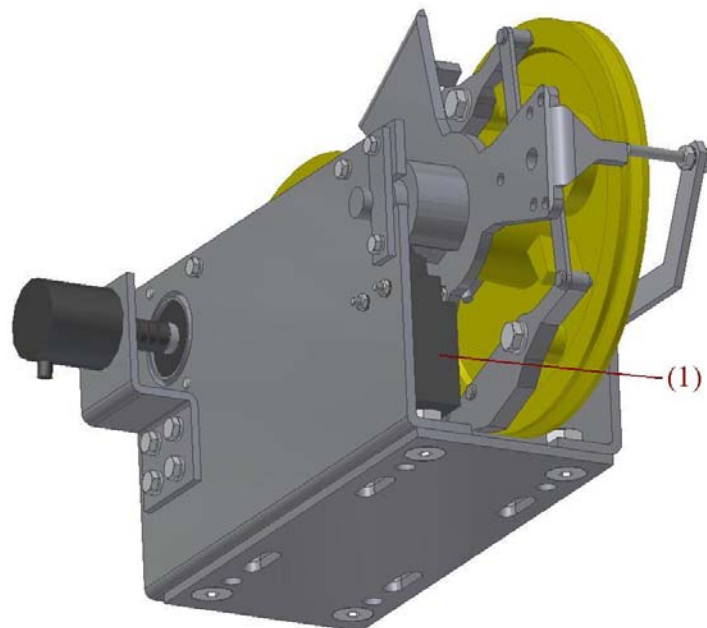
Some images of it, as well as its position in the set, are shown in the next pictures (1).



3.3 OVERSPEED CONTACT.

The governor has a built-in overspeed contact. Bearing in mind that the governor will be placed on the car, the contact will have automatic rearming. In any case, the initial starting after interlocking will be carried out by a qualified person, but without a direct access to the governor.

Below, a picture of the overspeed contact position is shown, where (1) is the automatic rearming contact.

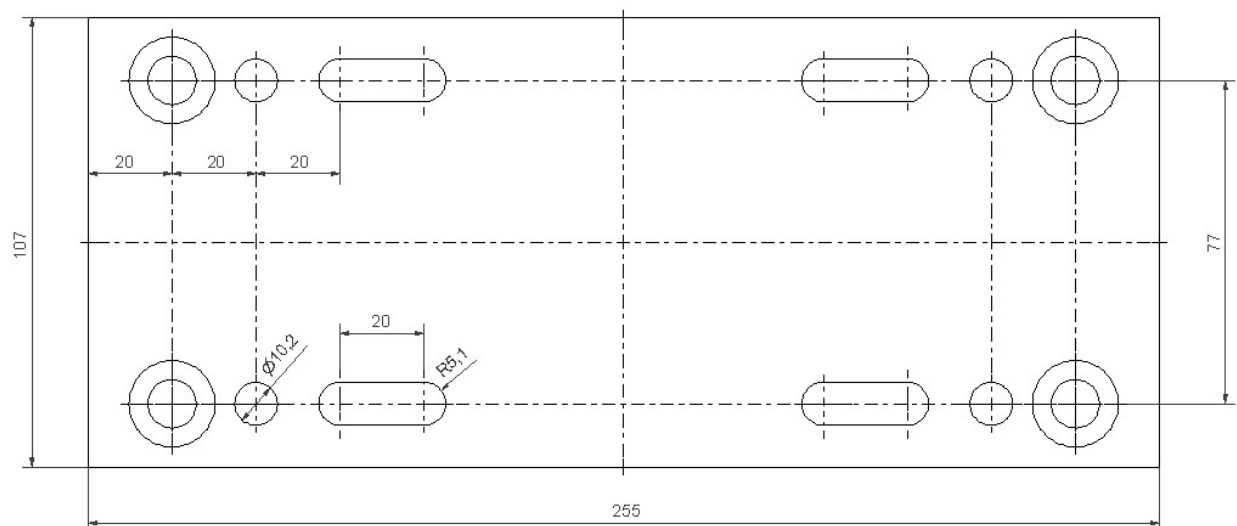


4 FIXING TO THE SLING.

The next figure shows the governor anchoring points to the lift sling. The measurements are in millimeters.

The governor must be anchored by means of 4 M10 screws of 8.8-quality. Suitable lengths are between 30 and 40 mm. Tightening torque must be 80 Nw·m.

It is advisable to use Autoblock nuts in order to avoid a possible screw loosening.



5 TECHNICAL FEATURES.

- **Machine:** overspeed governor
- **Model:** STAR plus
- **Manufacturing company:**
DYNATECH, DYNAMICS & TECHNOLOGY, S.L.
- **Range of use:**
Maximum rated speed: **2,3 m/s**

Maximum tripping speed: **2,66 m/s**

Minimum rated speed*: **0,1 m/s**

Minimum tripping speed: **0,35 - 0.6 m/s** **UNIDIRECTIONAL**

**From 0.6 – 2.66 m/s the limiter can be DOWNWARDS and
BIDIRECTIONAL*

- **Rope:**

Diameter: 6 mm

Composition: 6 x 19 + 1

- **Rope pretensing:**

450 N minimum (Spring tensioner)

490 N (Weight tensioner)

- **Tension produced in the rope when interlocking:**

Greater than 300 N

- **Pulley diameter:** 200 mm

- **Overspeed contact.**

- **Serial remote interlocking:**

- **Other features:**

- Possibility of mounting an anti-creep system (Parking System) that locks the overspeed governor when there is no current.
- Possibility of installing types of tensioners of greater versatility when mounting.
- Can be downwards or bidirectional.

- **Safety gears with which it may be used:**

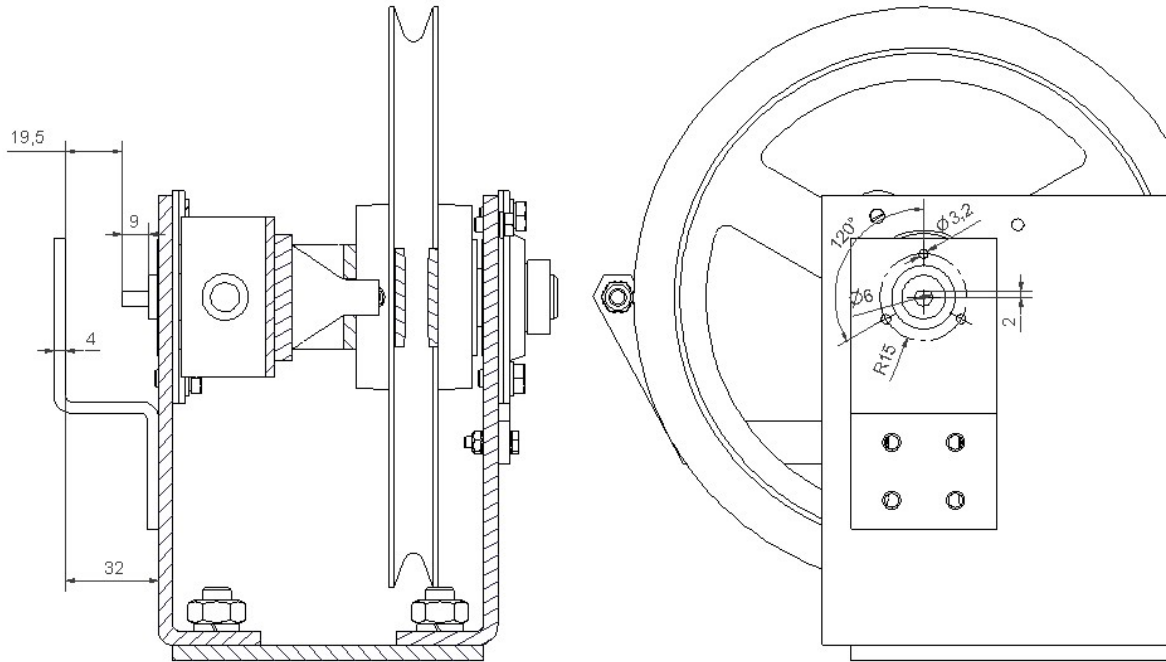
All safety gears whose tripping speed can be reached by the speed governor.

Remark: For tripping speeds below 1 m/s (generally instantaneous safety gears) a specifically designed version for low speeds will be supplied (**STAR BV**). This overspeed governor has the same dimensions and technical features as the standard one.

For performance speeds between 0.35 m/s – 0.6 m/s the STAR LS limiter will be fitted and has a DOWNWARDS system.

6 MEASUREMENTS FOR THE ENCODER COUPLING

Below, the measurements of the encoder location are shown, in case the customer install his own encoder.



7 ENCODER FEATURES

Dynatech supplies a 500-pulse encoder with the STAR PLUS speed governor that has the following features and of the make indicated. Clients may ask for it to be fitted on the speed governor.

OMRON

Rotary Encoder

E6B2-C

New General-purpose Incremental Rotary Encoder

- A wide operating voltage range of 5 to 24 VDC (open collector model).
- Resolution of 2,000 pulses/revolution in 40-mm housing.
- Phase Z can be adjusted with ease using the origin indicating function.
- A large load of 30 N in the radial direction and 20 N in the thrust direction is permitted.
- The load short-circuit and reversed connection protecting circuit assures highly reliable operation.
- A line driver output model is available. (Cable extends up to 100 m.)



Ordering Information

Supply voltage	Output configuration	Resolution (P/R)	Model
5 to 24 VDC	NPN open collector output	10/20/30/40/50/60/100/200/300/360/400/500/600/720/800/1,000/1,024/1,200/1,500/1,800/2,000	E6B2-CWZ6C
12 to 24 VDC	PNP open collector output	100/200/360/500/600/1,000/2,000	E6B2-CWZ5B
5 to 12 VDC	Voltage output	10/20/30/40/50/60/100/200/300/360/400/500/600/1,000/1,200/1,500/1,800/2,000	E6B2-CWZ3E
5 VDC	Line driver output	10/20/30/40/50/60/100/200/300/360/400/500/600/1,000/1,024/1,200/1,500/1,800/2,000	E6B2-CWZ1X

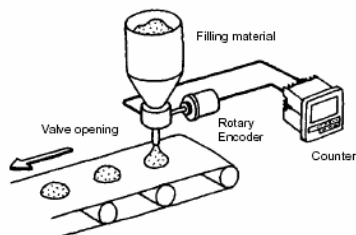
Note: When ordering, specify the resolution together with the model number.

■ Accessories (Order Separately)

Name	Model
Coupling	E69-C06B (attachment)
	E69-C68B
	E69-C610B
	E69-C06M
Flange	E69-FBA
	E69-FBA02 (E69-2 Mounting Bracket included)
Mounting Bracket	E69-2

Application Example

Filling Control



E6B2-C **OMRON** **E6B2-C**

Specifications

■ Ratings/Characteristics

Electrical

Item	E6B2-CWZ6C	E6B2-CWZ5B	E6B2-CWZ3E	E6B2-CWZ1X
Power supply voltage	5 VDC -5% to 24 VDC +15%	12 VDC -10% to 24 VDC +15%	5 VDC -5% to 12 VDC +10%	5 VDC ±5%
Current consumption (see note 3)	70 mA max.	80 mA max.		130 mA max.
Resolution	10/20/30/40/50/60/100/ 200/300/360/400/500/ 600/720/800/1,000/ 1,024/1,200/1,500/ 1,800/2,000 P/R	100/200/360/500/600/ 1,000/2,000 P/R	10/20/30/40/50/60/100/ 200/300/360/400/500/ 600/1,000/1,200/1,500/ 1,800/2,000 P/R	10/20/30/40/50/60/100/200/ 300/360/400/500/600/1,000/ 1,024/1,200/1,500/1,800/ 2,000 P/R
Output phases	A, B, and Z (reversible)			A, \bar{A} , B, \bar{B} , Z, \bar{Z}
Output configuration	Open collector	Open collector	Voltage	Line driver (see note 2)
Output capacity	30 VDC max. 35 mA max. Residual voltage: 0.4 V max.	35 mA max. Residual voltage: 0.4 V max.	20 mA max. Residual voltage: 0.4 V max.	AM26LS31 equivalent Output current: High level = I_{OH} = -20 mA Low level = I_{OL} = 20 mA Output voltage: High level = V_{OH} = 2.5 V min. Low level = V_{OL} = 0.5 V max.
Max. response frequency (see note 1)	100 kHz	50 kHz	100 kHz	
Phase difference on output	90°±45° between A and B (1/4T±1/8T)			
Rise and fall times of output	1 μ s max. (control output voltage: 5 V; load resistance: 1 k Ω ; cable length: 0.5 m)	1 μ s max. (cable length: 2 m; I_{sink} : 10 mA max.)	1 μ s max. (cable length: 0.5 m; I_{sink} : 10 mA max.)	0.1 μ s max. (cable length: 0.5 m; I_{O} : -20 mA; I_{S} : 20 mA)
Insulation resistance	20 M Ω min. (at 500 VDC) between carry parts and case			
Dielectric strength	500 VAC, 50/60 Hz for 1 min between carry parts and case			

- Note:** 1. The maximum electrical response revolution is determined by the resolution and maximum response frequency as follows:
Maximum electrical response frequency (rpm) = Maximum response frequency/resolution x 60
This means that the E6B2-C Rotary Encoder will not operate electrically if its revolution exceeds the maximum electrical response revolution.
2. The line driver output is a data transmission circuit compatible with RS-422A and long-distance transmission is possible with a twisted-pair cable.
3. An inrush current of approximately 9 A will flow for approximately 0.3 ms when the power is turned ON.

Mechanical

Item	E6B2-CWZ6C	E6B2-CWZ5B	E6B2-CWZ3E	E6B2-CWZ1X
Shaft loading	Radial: 30 N Thrust: 20 N			
Moment of inertia	1 x 10 ⁻⁶ kg • m ² max.; 3 x 10 ⁻⁷ kg • m ² max. at 600 P/R max.			
Starting torque	980 μ N • m max.			
Max. permissible revolution	6,000 rpm			
Vibration resistance	Destruction: 10 to 500 Hz, 150 m/s ² or 2-mm double amplitude for 11 min 3 times each in X, Y, and Z directions			
Shock resistance	Destruction: 1,000 m/s ² 3 times each in X, Y, and Z directions			
Weight	Approx. 100 g max. (cable length: 0.5 m)			

Environmental

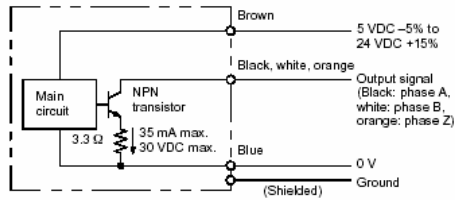
Item	E6B2-CWZ6C	E6B2-CWZ5B	E6B2-CWZ3E	E6B2-CWZ1X
Ambient temperature	Operating: -10°C to 70°C (with no icing) Storage: -25°C to 85°C (with no icing)			
Ambient humidity	Operating: 35% to 85% (with no condensation)			
Degree of protection	IEC60529 IP50			

E6B2-C **OMRON** **E6B2-C**

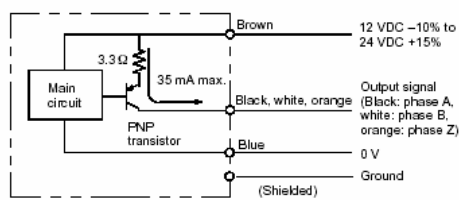
Operation

Output Circuits

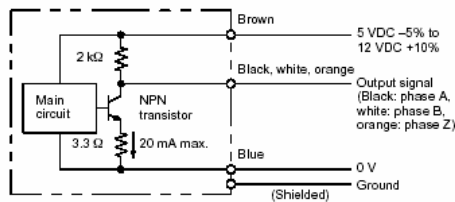
E6B2-CWZ6C



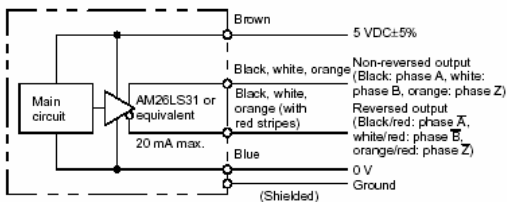
E6B2-CWZ5B



E6B2-CWZ3E



E6B2-CWZ1X



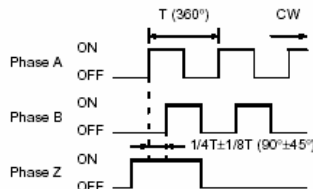
Timing Charts

Open Collector Output

E6B2-CWZ6C

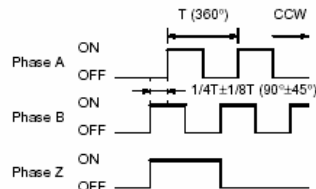
E6B2-CWZ5B

Direction or resolution: CW
(As viewed from the end of the shaft)



Note: Phase A is $1/4 \pm 1/8T$ faster than phase B. The ONs in the above timing chart mean that the output transistor is ON and the OFFs mean that the output transistor is OFF.

Direction or resolution: CCW
(As viewed from the end of the shaft)

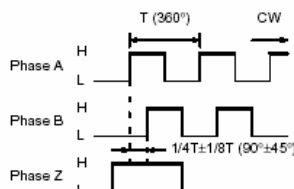


Note: Phase A is $1/4 \pm 1/8T$ slower than phase B.

Voltage Output

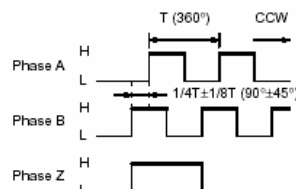
E6B2-CWZ3E

Direction or resolution: CW
(As viewed from the end of the shaft)



Note: Phase A is $1/4 \pm 1/8T$ faster than phase B.

Direction or resolution: CCW
(As viewed from the end of the shaft)



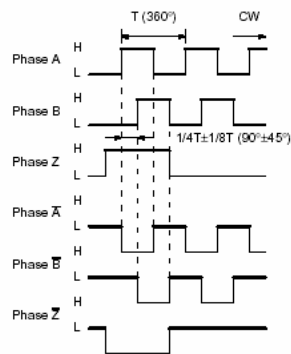
Note: Phase A is $1/4 \pm 1/8T$ slower than phase B.

E6B2-C **OMRON** **E6B2-C**

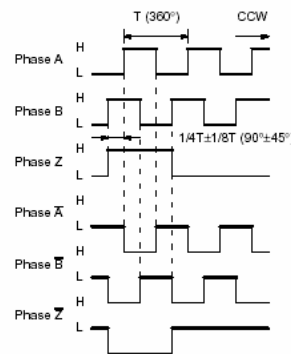
Line Driver Output

E6B2-CWZ1X

Direction or resolution: CW
(As viewed from the end of the shaft)



Direction or resolution: CCW
(As viewed from the end of the shaft)



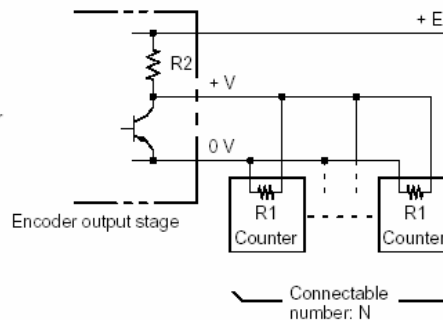
Note: The line driver output circuit is an RS-422A data transmission circuit consisting of two balanced output lines. The relationship between the two output lines is on an equal status. This means that if the level of the signal on a line is H, the level of the signal on the other line is L. The noise-resistive line driver output circuit assures high-speed data transmission.

Input to More than One Counter from Encoder (with Voltage Output)

Use the following formula to obtain the number of counters to be connected to a single E6B2-C Rotary Encoder.

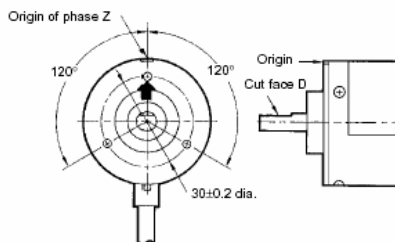
$$\text{Number of counters (N)} = \frac{R1 (E-V)}{V \times R2}$$

- E: Voltage supplied to Rotary Encoder
- V: Minimum input voltage of the counter
- R2: Output resistance of the Rotary Encoder
- R1: Input resistance of the counter



Origin Indication

It is easy to adjust the position of phase Z with the origin indication function. The following illustration (on the left-hand side) shows the relationship between phase Z and the origin. Set cut face D to the origin as shown in the illustration (on the right-hand side).



Output Protection Circuit

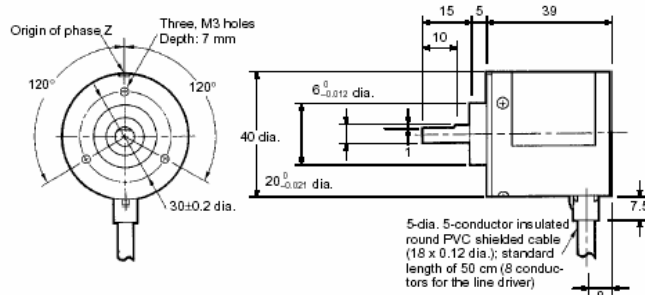
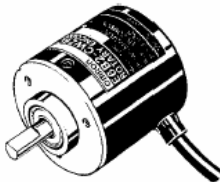
The E6B2-C (open collector model with voltage output) incorporates a circuit preventing the E6B2-C from damage due to a short-circuited load and reversed connection.

E6B2-C **OMRON** **E6B2-C**

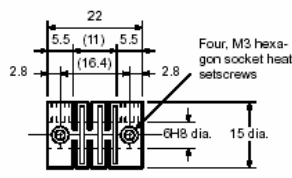
Dimensions

Note: All units are in millimeters unless otherwise indicated.

E6B2-C

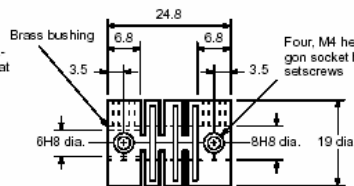


**Coupling
E69-C06B
(Included)**

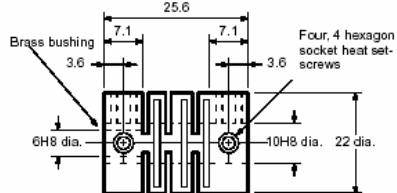


Note: The coupling is made of glass-reinforced PBT.

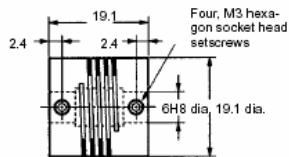
**E69-C68B
(Sold Separately, Different Diameter)**



**E69-C610B
(Sold Separately, Different Diameter)**



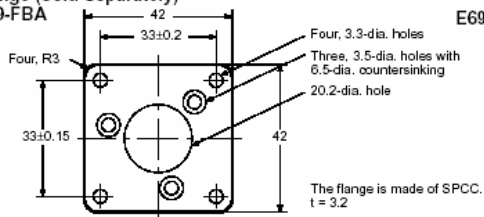
**E69-C06M
(Sold Separately, Different Diameter)**



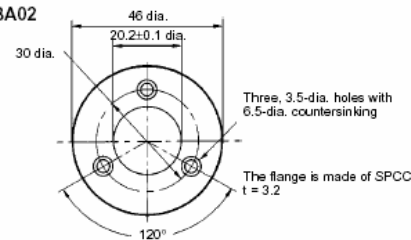
Note: The coupling is made of extra super duralumin.

Flange (Sold Separately)

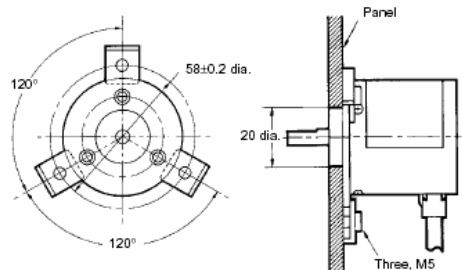
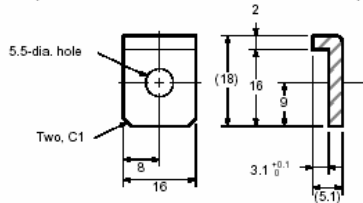
E69-FBA



E69-FBA02



**Mounting Bracket (Three Pieces as a Set)
E69-2 (One Set Provided with the E69-FBA02)**



E6B2-C **OMRON** **E6B2-C**

Installation

■ Connection

Be sure to connect the external terminals correctly or the E6B2-C Rotary Encoder may be damaged.

E6B2-CWZ6C/-CWZ5B/-CWZ3E

Color	Terminal
Brown	Power supply (+V _{CC})
Black	Output phase A
White	Output phase B
Orange	Output phase Z
Blue	0 V (common)

E6B2-CWZ1X

Color	Terminal
Brown	Power supply (+V _{CC})
Black	Output phase A
White	Output phase B
Orange	Output phase Z
Black/red stripes	Output phase \bar{A}
White/red stripes	Output phase \bar{B}
Orange/red stripes	Output phase \bar{Z}
Blue	0 V (common)

Note: Receiver: AM26LS32 equivalent

- Note:
1. The external conductor (shield) of the shielded cable is not connected to the internal conductors nor to the case.
 2. All the phases A, B, and Z are in the same circuit.
 3. Connect the GND to the 0-V line or to the ground terminal.

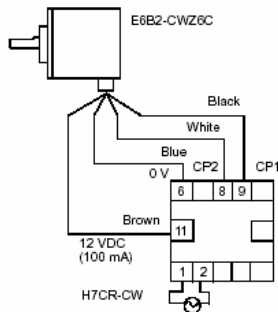
■ Connections with Peripheral Devices

Coupling	Specification	Resin, standard type				Resin, non-standard opening diameter		Metal	
		4 (H8), 13	6 (H8), 15	8 (H8), 19	10 (H8), 22	6/8 (H8), 19	6/10 (H8), 22	6 (H8), 19.1	10 (H8), 25.4
Rotary Encoder	Model	E69-C04B	E69-C06B	E69-C08B	E69-C10B	E69-C68B	E69-C610B	E69-C06M	E69-C10M
E6B2, 6-mm diameter		C	A	C	C	B	B	B	C

- Note:
- A: Possible to connect directly in most cases.
 - B: Possible to connect, but an independent power supply or pull-up resistor will be required.
 - C: Impossible to connect.

Connection Examples

Connection to H7CR-CW Counter

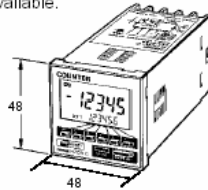


Features of H7CR

DIN-sized (DIN 48) counter incorporating a prescale function converting the measured value to the actual value.

Synchronized output and \pm indication are available (\pm area models).

Models with a general-purpose six-digit display and four-digit display are available.



Connection to K3NR-NB□□□/K3NP-NB□□□ Rotary Intelligent Signal Processor

Features of K3NR/K3NP

Each model incorporates a prescale function with an input range of 50 kHz and the measurement accuracy is 0.006%.

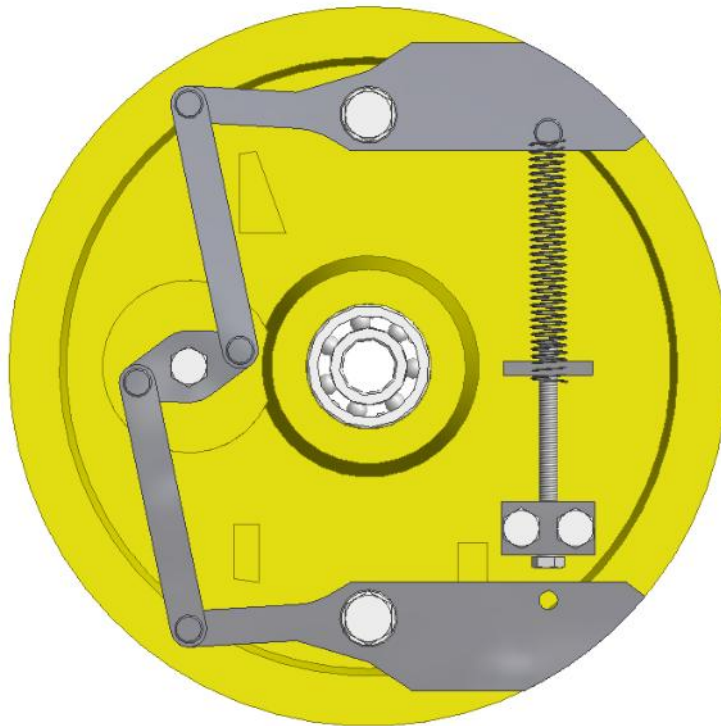
A variety of outputs, including relay, transistor, BCD, linear, and communications outputs, are available.



8 TYPE OF ADJUSTMENT.

Tripping speed adjusting is carried out by means of a regulating screw which tenses or detenses the centrifugal system spring. When tensing the spring, the speed required to drive the centrifugal system will be higher. In this way, tripping speed can be adjusted within the speed range.

The adjustment is carried out in the factory by means of a computerized gauging system according to the customer specifications. Once the adjustment is finished and checked, it is sealed so that it can not be modified.



9 INSTRUCTIONS FOR USE AND MAINTENANCE.

The instructions and advice on the use and maintenance of the speed governor are exactly the same as for the STAR speed governor.

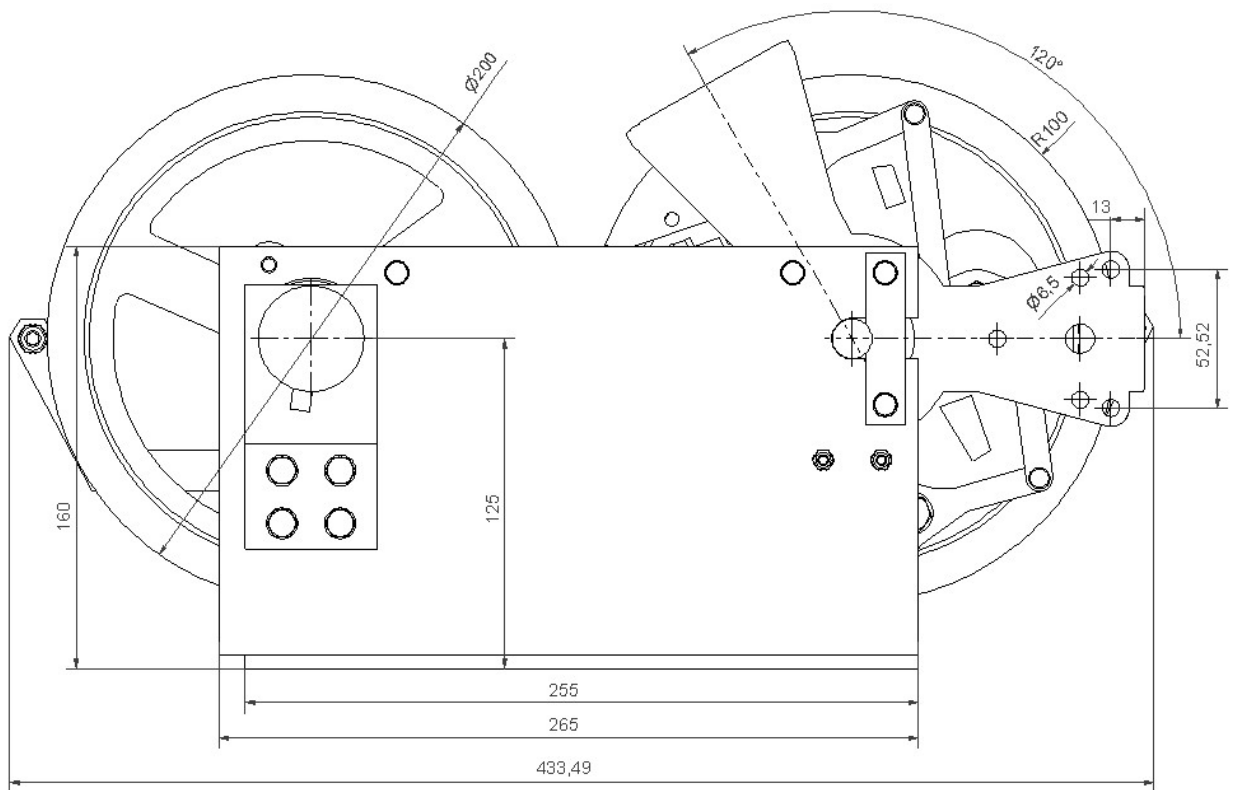
In the event of a speed governor being fitted with an encoder, this must remain free of dirt and the coupling must be in perfect condition in order to transmit the

movement of the pulley to the encoder.

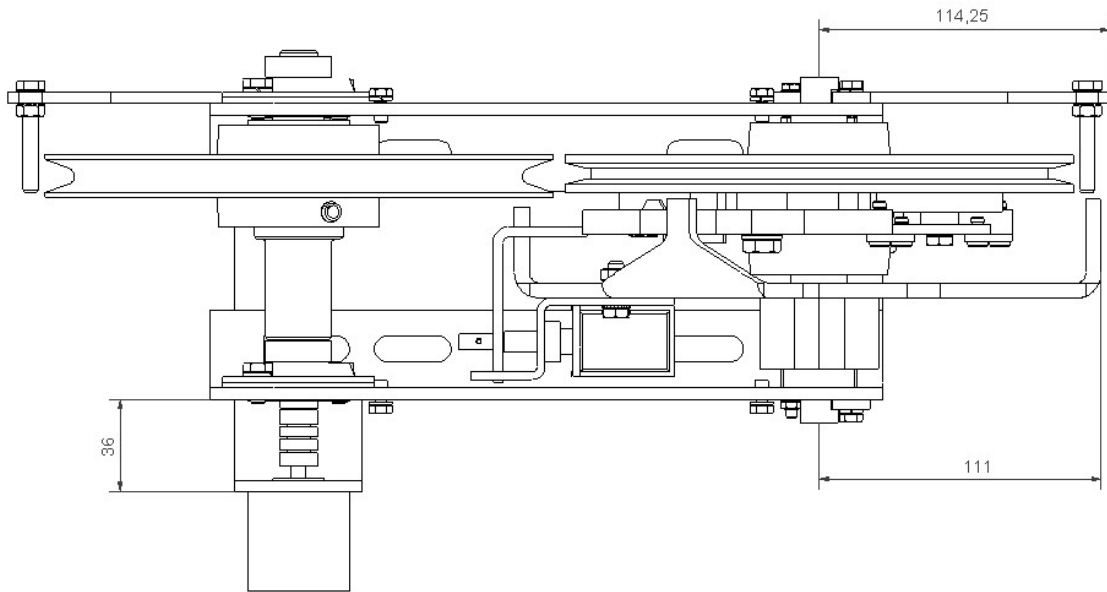
10 INSTALLATION DRAWINGS

The following drawings may be helpful when adapting and installing the STAR overspeed governor to the sling.

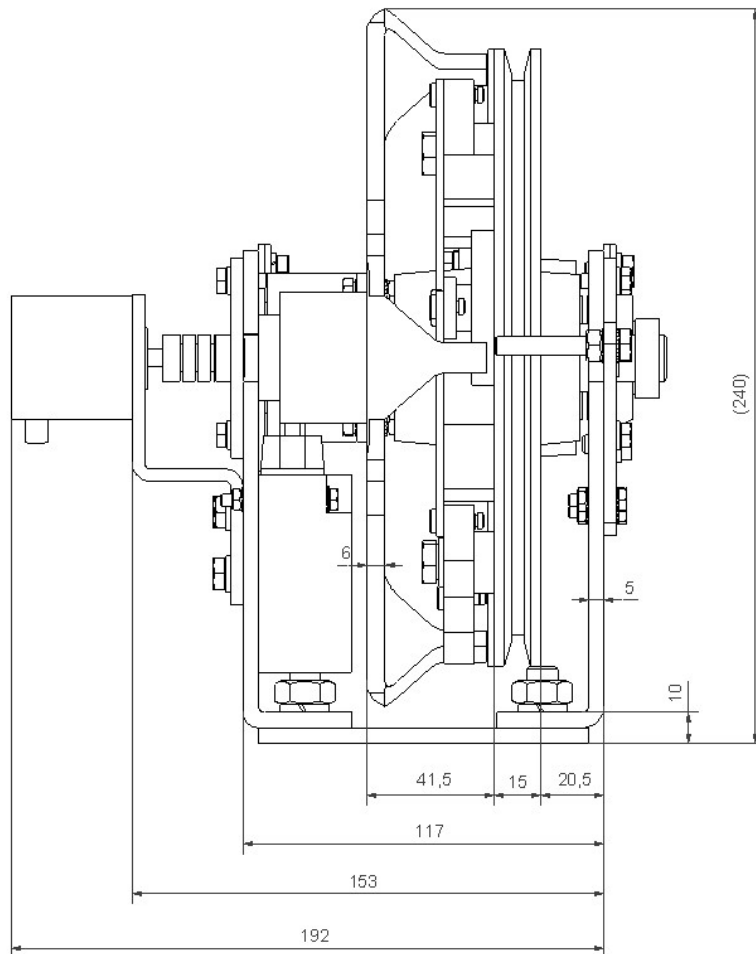
Front view:



Botom view:



Side view:



11 EC TYPE-EXAMINATION CERTIFICATE.

The type certificate for the STAR PLUS is the same as that of the STAR speed governor. Therefore, please consult the STAR speed governor manual to see the certificates.