

Fig. 6b: Basic connection diagrams

ONLY PHASE "X" OF RS9/RS9.3/RSV9.3 - 10.19.1W SHOWN

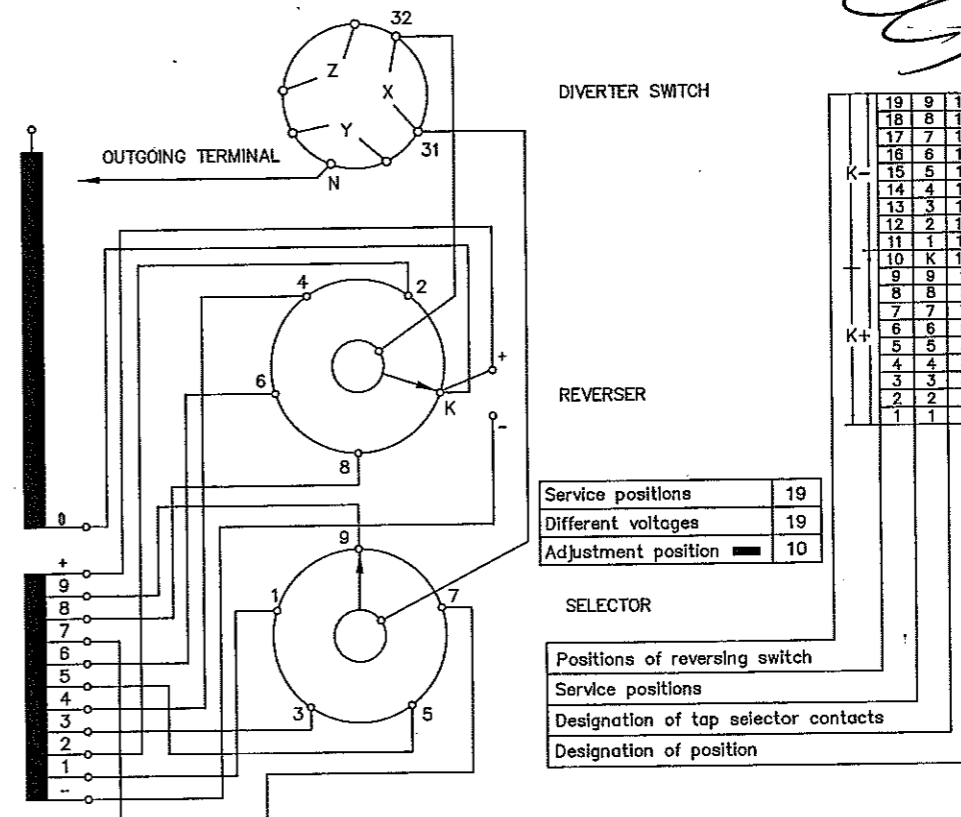


Fig. 7: Basic connection diagram 10 19 1W

ONLY PHASE "X" OF RS9/RS9.3/RSV9.3 - 10.19.3W SHOWN

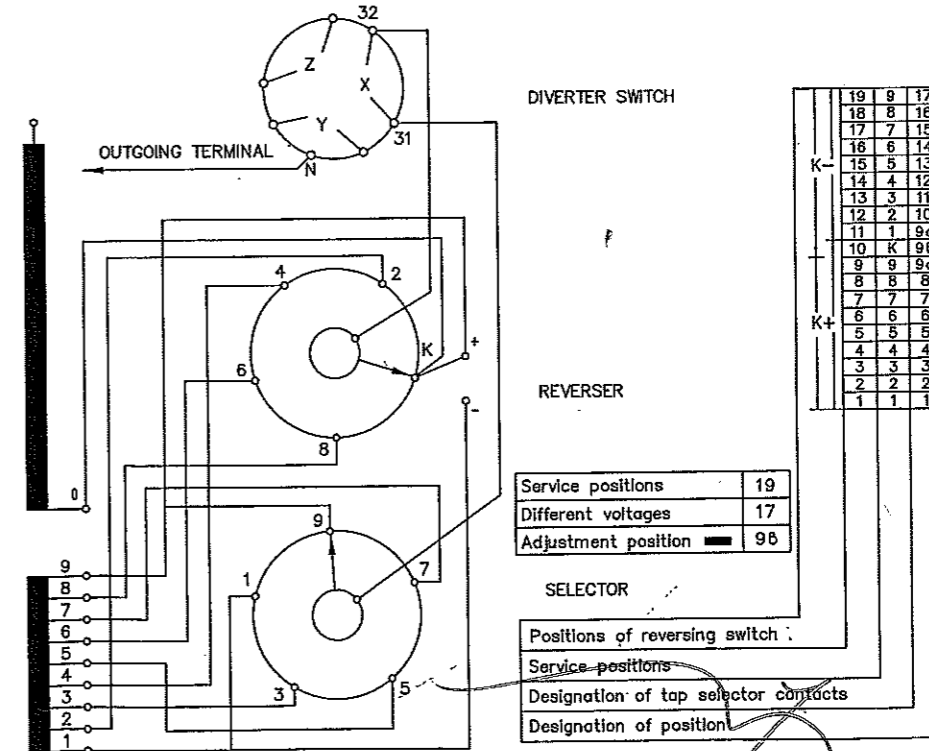


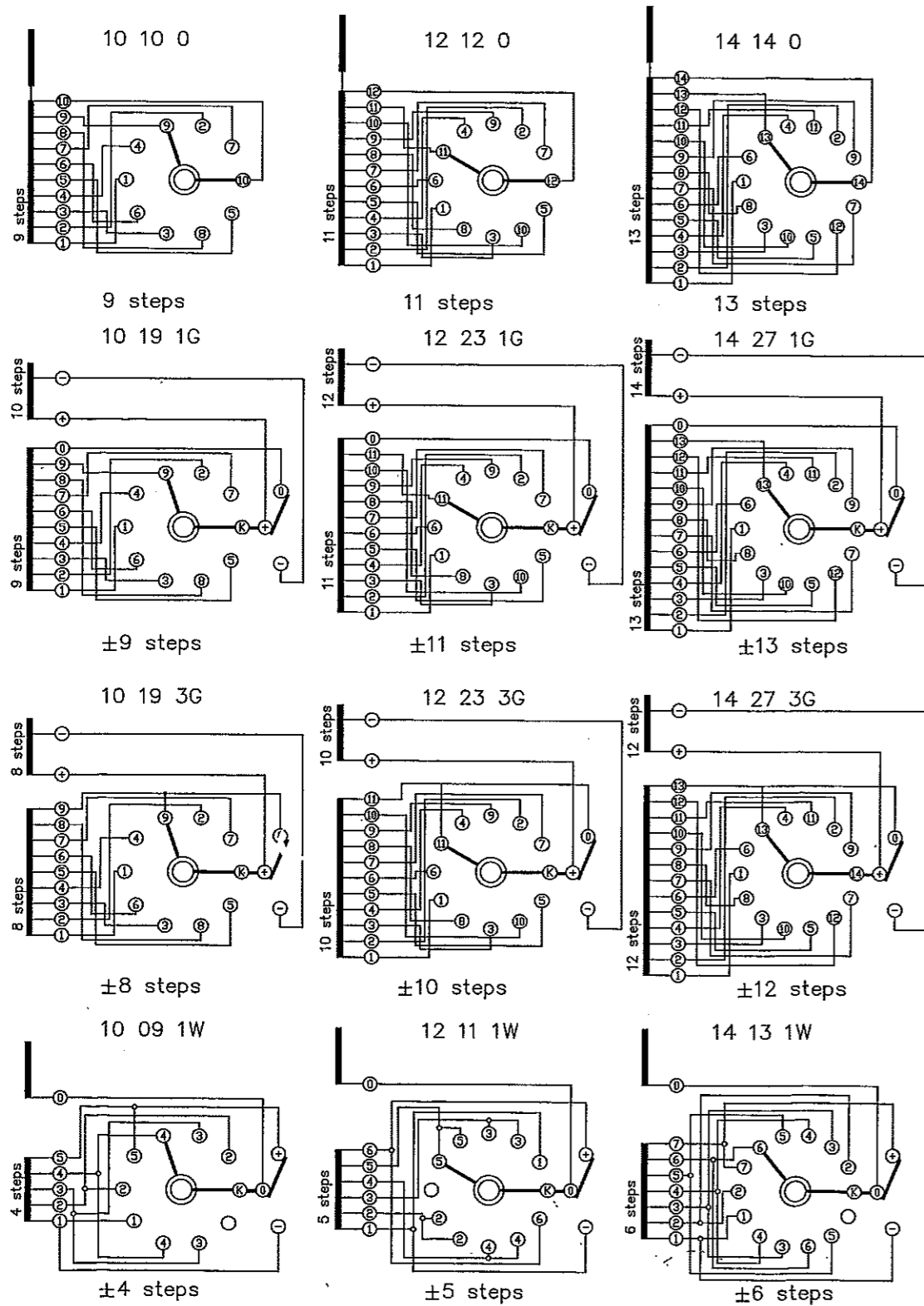
Fig. 8: Basic connection diagram 10 19 3W

C 109

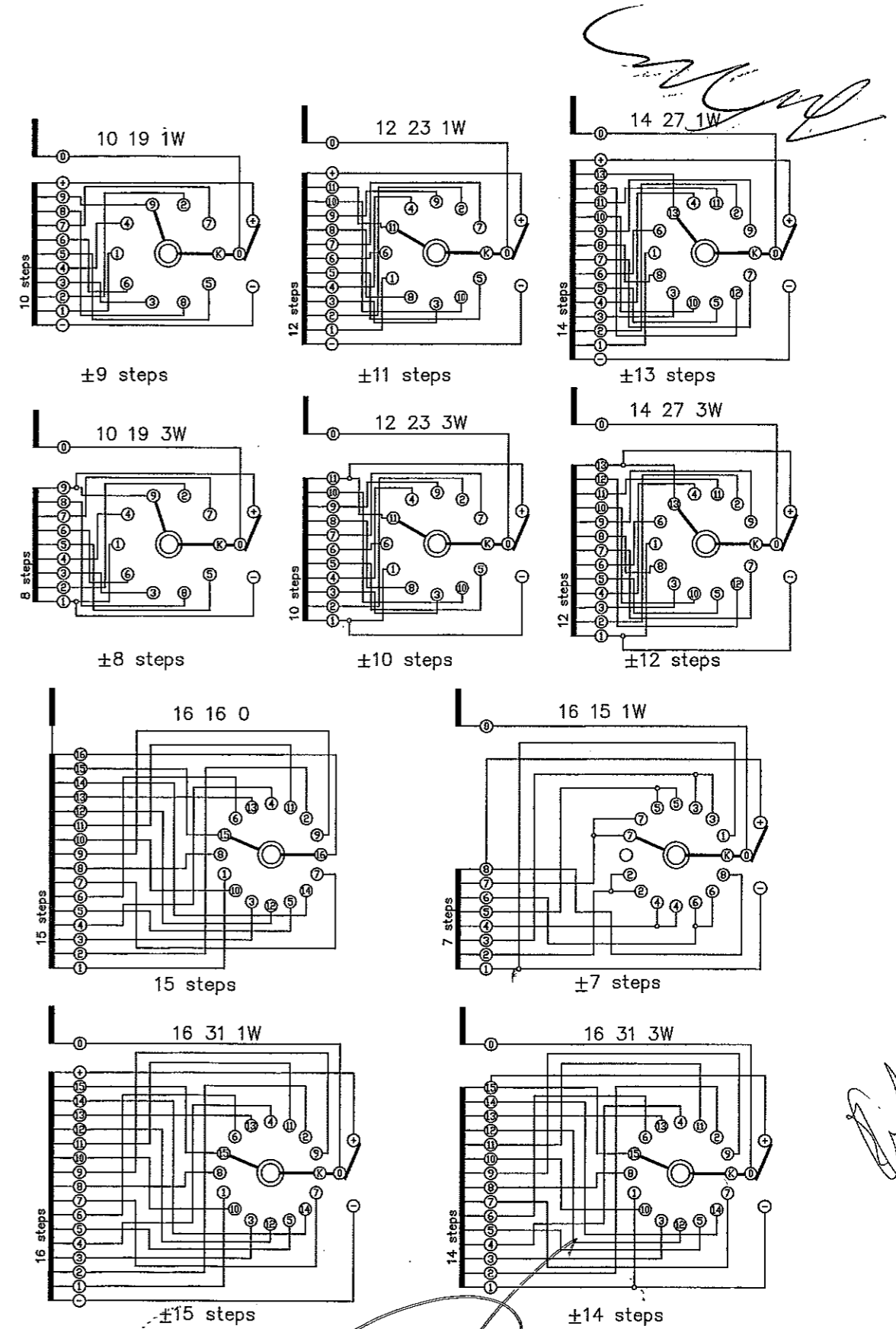
101-0

**2.2 Number of steps and basic connection diagrams**

Fig. 6, 6a and 6b show the basic connection diagrams where the selector contacts are designated according to the overall dimension drawings.



**Fig. 6:** Basic connection diagrams



**Fig. 6a:** Basic connection diagrams

ONLY PHASE "X" OF RS9/RS9.3/RSV9.3 - 10.19.1G SHOWN

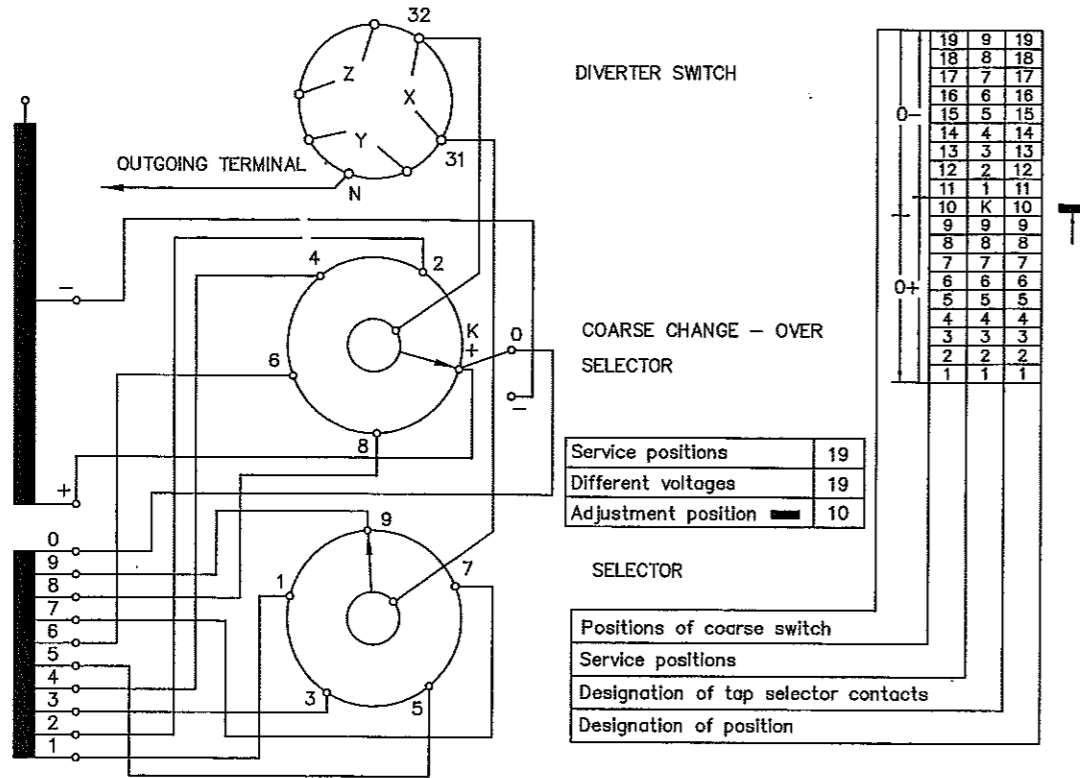


Fig. 9: Basic connection diagram 10 19 1G

ONLY PHASE "X" OF RS9/RS9.3/RSV9.3 - 10.19.3G SHOWN

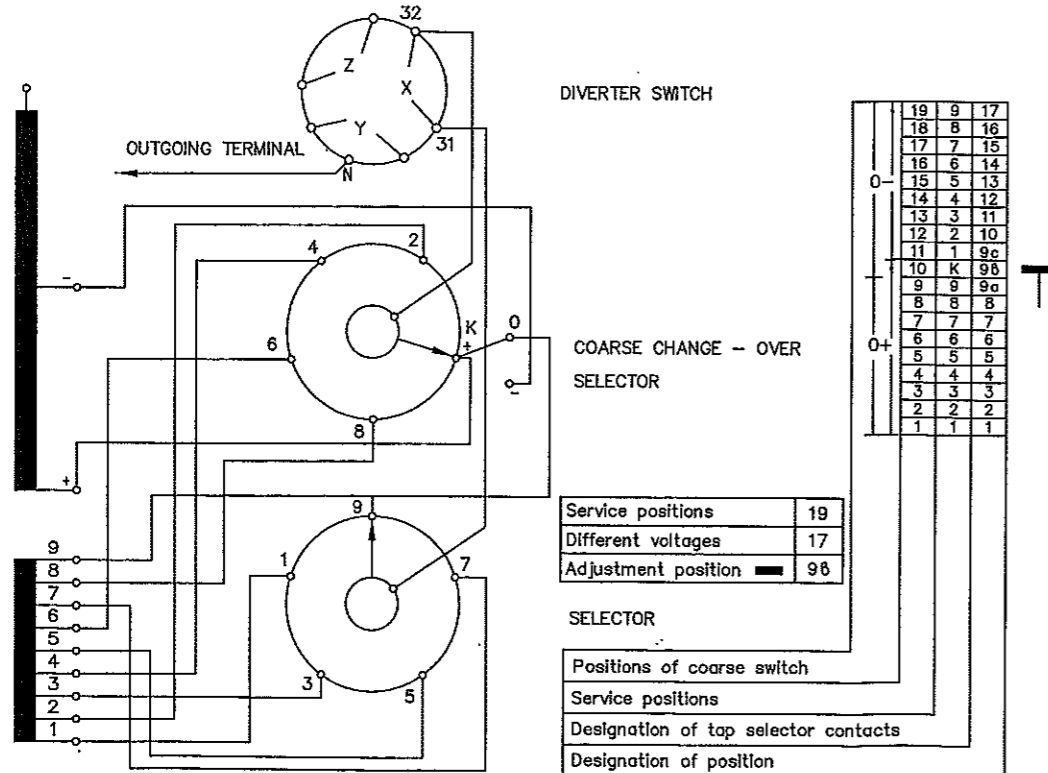


Fig. 10: Basic connection diagram 10 19 3G

3. Appendices

3.1. Overall dimension drawings of OLTCs

|  |       |
|--|-------|
| RSV 9.3 - III - 400/550/700                            | №1075 |
| RSV 9.3 - III - 400/550/700-P                          | №1078 |
| RSV 9.3 - I - 400/550/700                              | №1074 |
| RSV 9.3 - I - 400/550/700-P                            | №1079 |
| RSV 9.3 - II - 400/550/700                             | №1076 |
| RSV 9.3 - I - 1200                                     | №1077 |
| RSV 9.3 - I - 1200 245/P-10.19.3 W                     | №1080 |
| RSV 9.3 - I - 1500                                     | №1084 |
| OLTCs with pressure relief device and tie-in resistors | №310Q |
| OLTCs RS 9.3 /RSV 9.3 flange's configuration           | №999  |

3.2. Additional drawings of OLTCs

|  |      |
|--|------|
| RS 9.3/RSV 9.3 - III - 10, 12, 14 - arrangement of the selector contacts | №374 |
| RS 9.3/RSV 9.3 - III - 16, 18 - arrangement of the selector contacts     | №375 |
| RS 9.3/RSV 9.3 - I - 10, 12, 14 - arrangement of the selector contacts   | №376 |
| RS 9.3/RSV 9.3 - I - 16, 18 - arrangement of the selector contacts       | №377 |

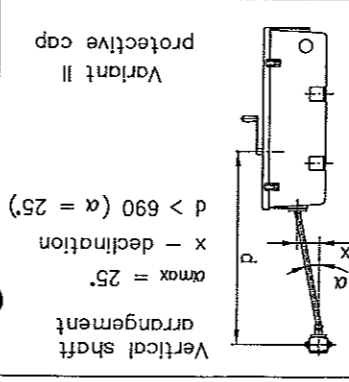
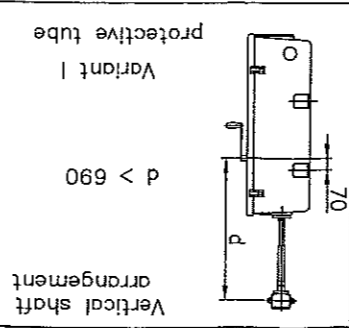
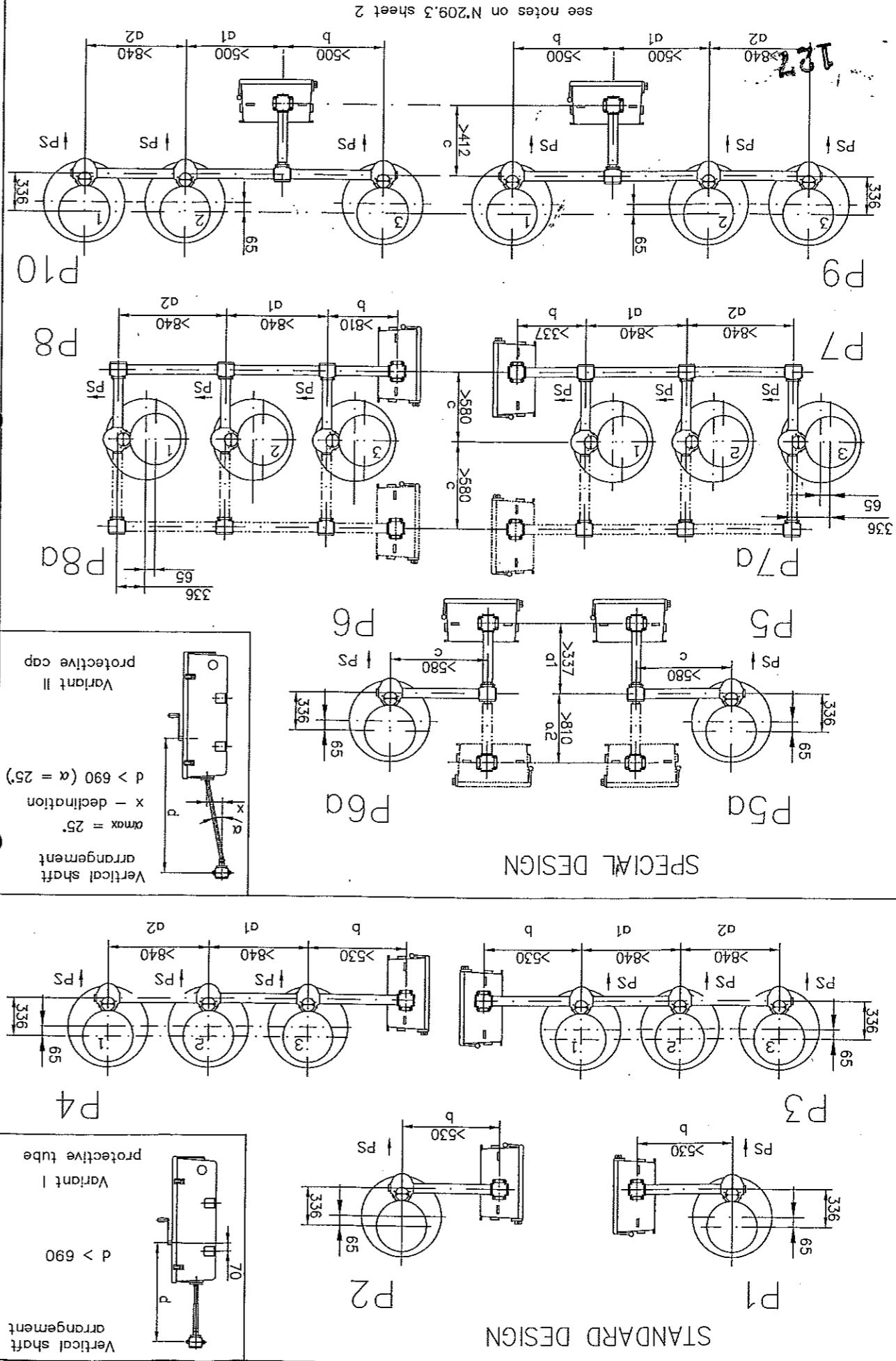
3.3. OLTC type RS 9.3 - driving shafts arrangement

№209.3

111

111

112

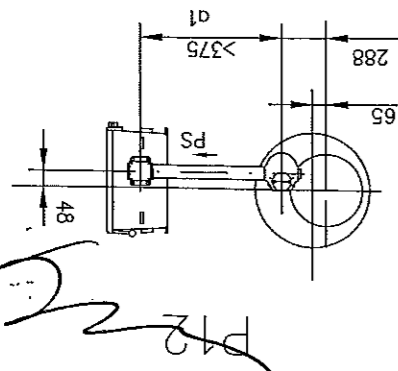
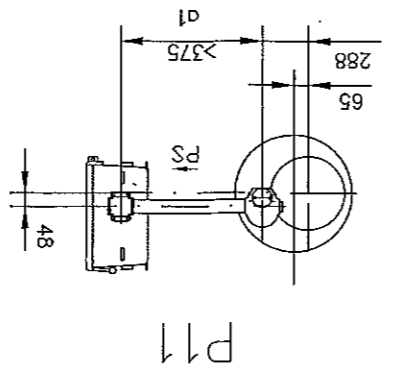


NOTES:  
1. "L"-Driving shaft length  
2. PS - Disposal of change-over selector  
3. In case of two units - numbers 3 or 1 are omitted  
4. Distances are determined for mechanical reasons.  
The insulating distances are not considered

|             |        |        |                |     |     |    |    |    |        |        |        |        |        |        |        |        |
|-------------|--------|--------|----------------|-----|-----|----|----|----|--------|--------|--------|--------|--------|--------|--------|--------|
| Arrangement | Length |        |                | Ld1 | Ld2 | Lb | Lc | Ld |        |        |        |        |        |        |        |        |
|             | P7 P7a | P8 P8a | P9 P10 P11 P12 |     |     |    |    |    | d1-280 | d1-315 | d1-280 | d2-280 | d2-345 | d1-315 | d1-280 | d2-280 |

|             |        |       |                  |     |     |    |    |    |        |        |        |        |        |        |        |        |        |
|-------------|--------|-------|------------------|-----|-----|----|----|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Arrangement | Length |       |                  | Ld1 | Ld2 | Lb | Lc | Ld |        |        |        |        |        |        |        |        |        |
|             | P1     | P2 P3 | P4 P5 P5a P6 P6a |     |     |    |    |    | d1-280 | d1-345 | d1-280 | d2-280 | d2-345 | d1-280 | d2-280 | d2-345 | d1-280 |

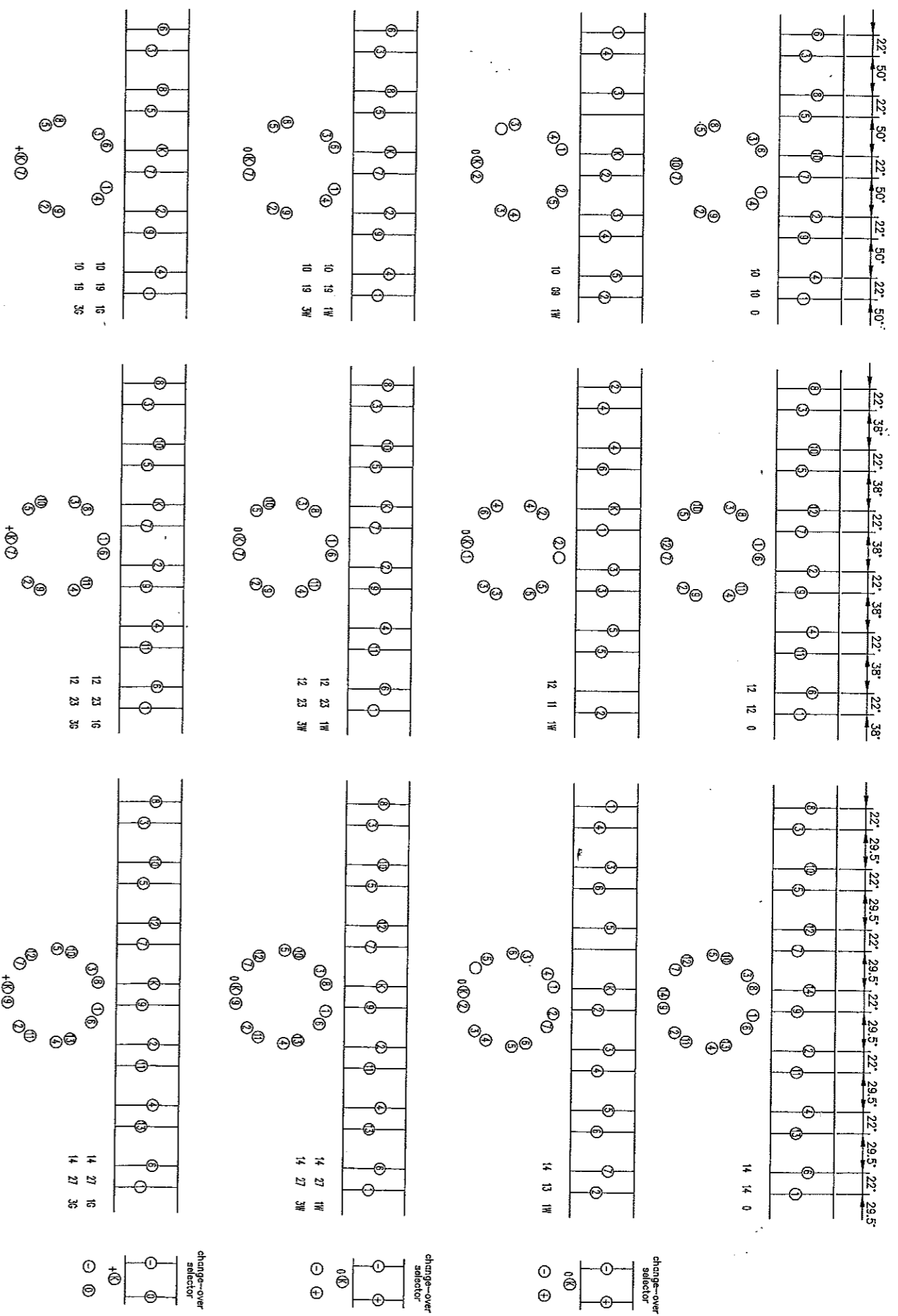
CALCULATION ( FORMULAS )



SPECIAL DESIGN

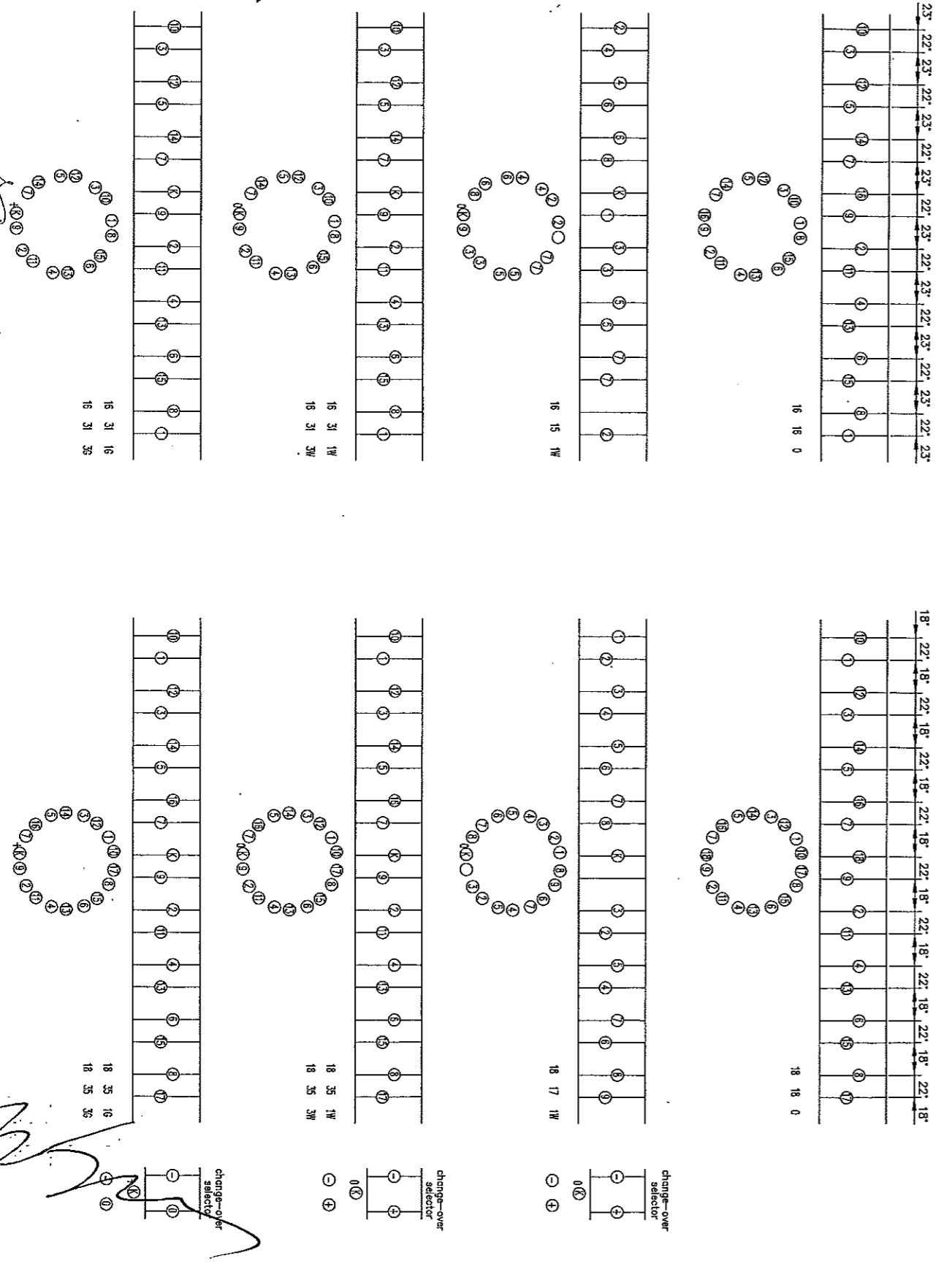
138

12 U<sub>1</sub>



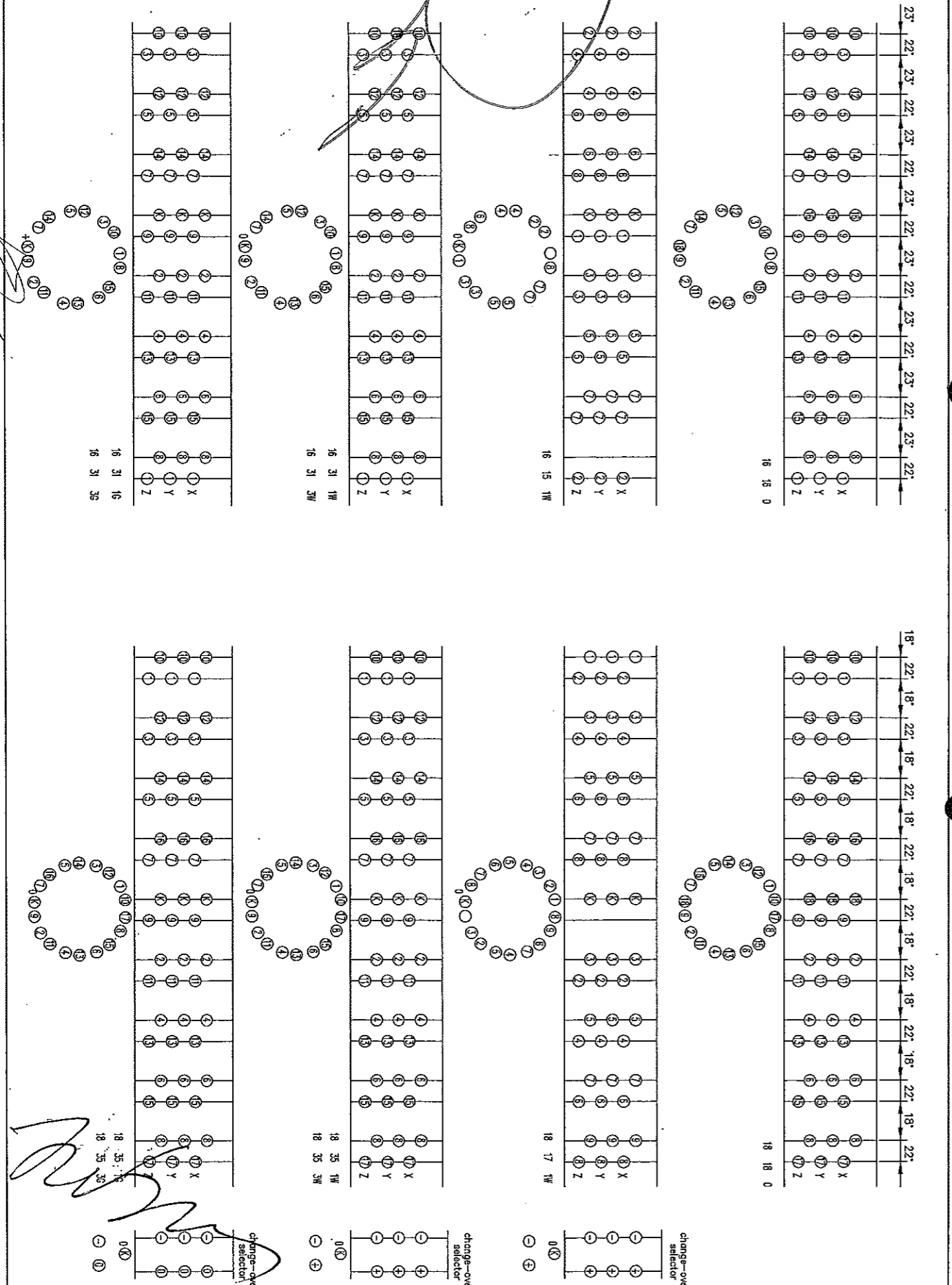
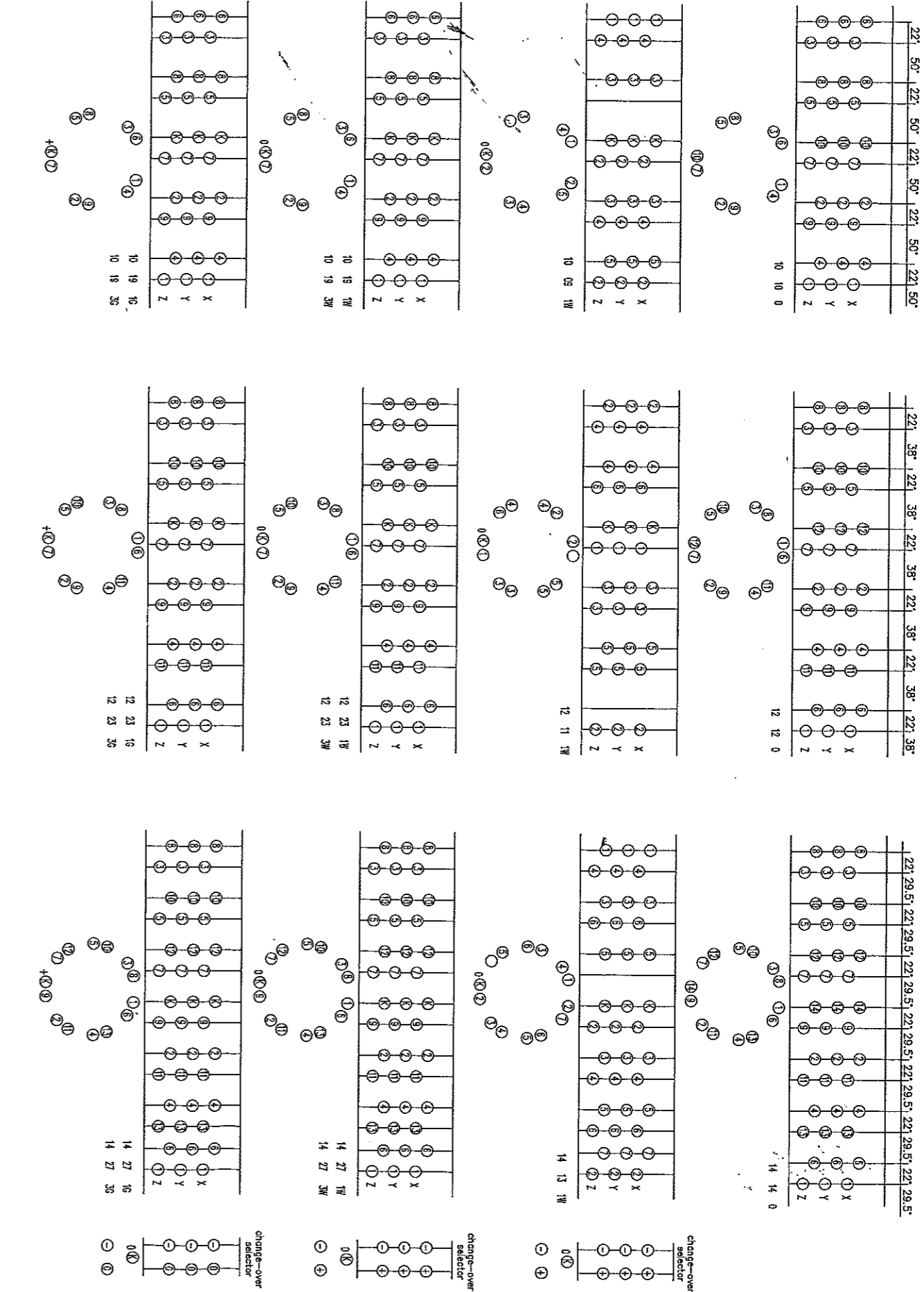
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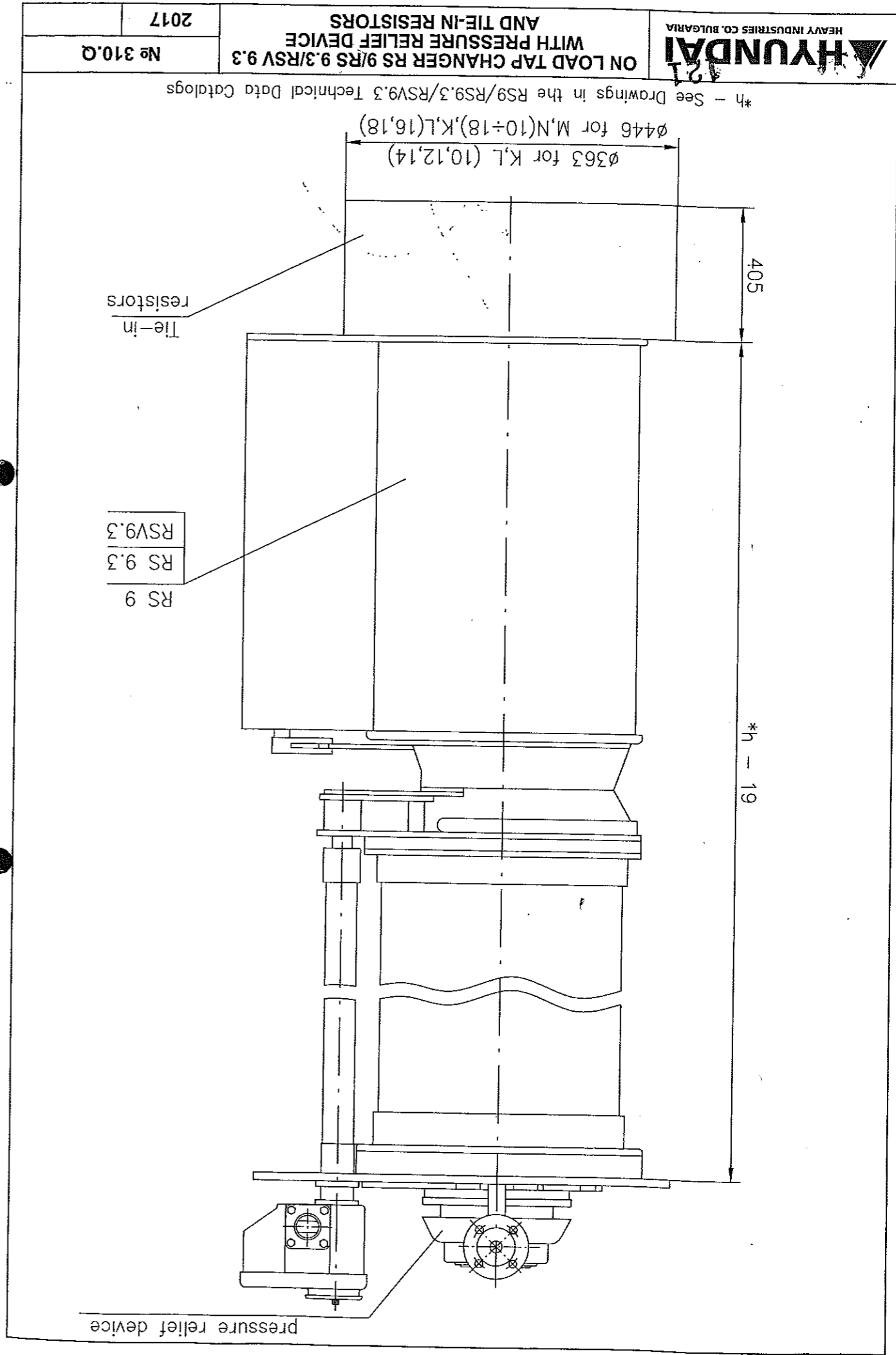
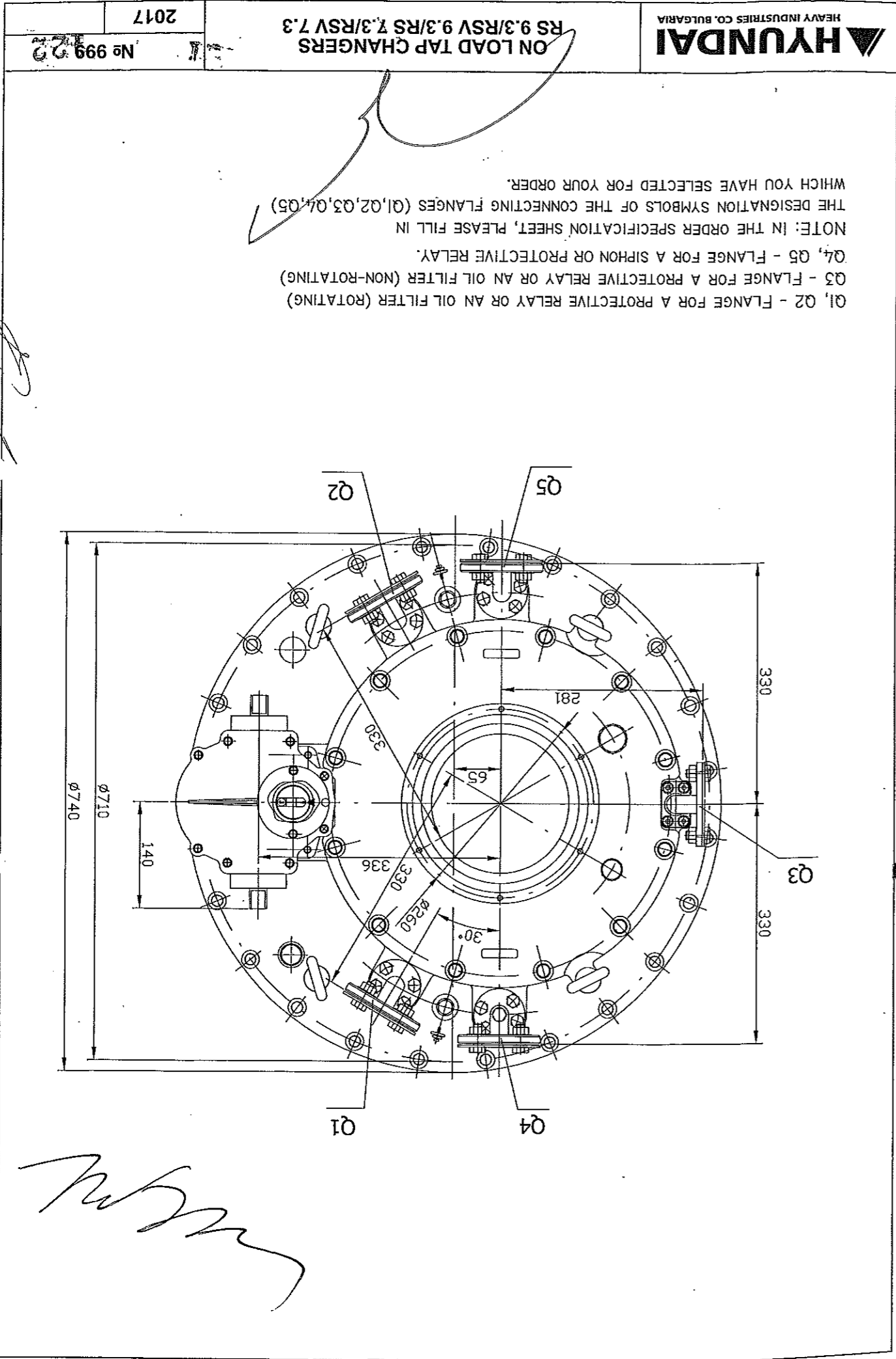
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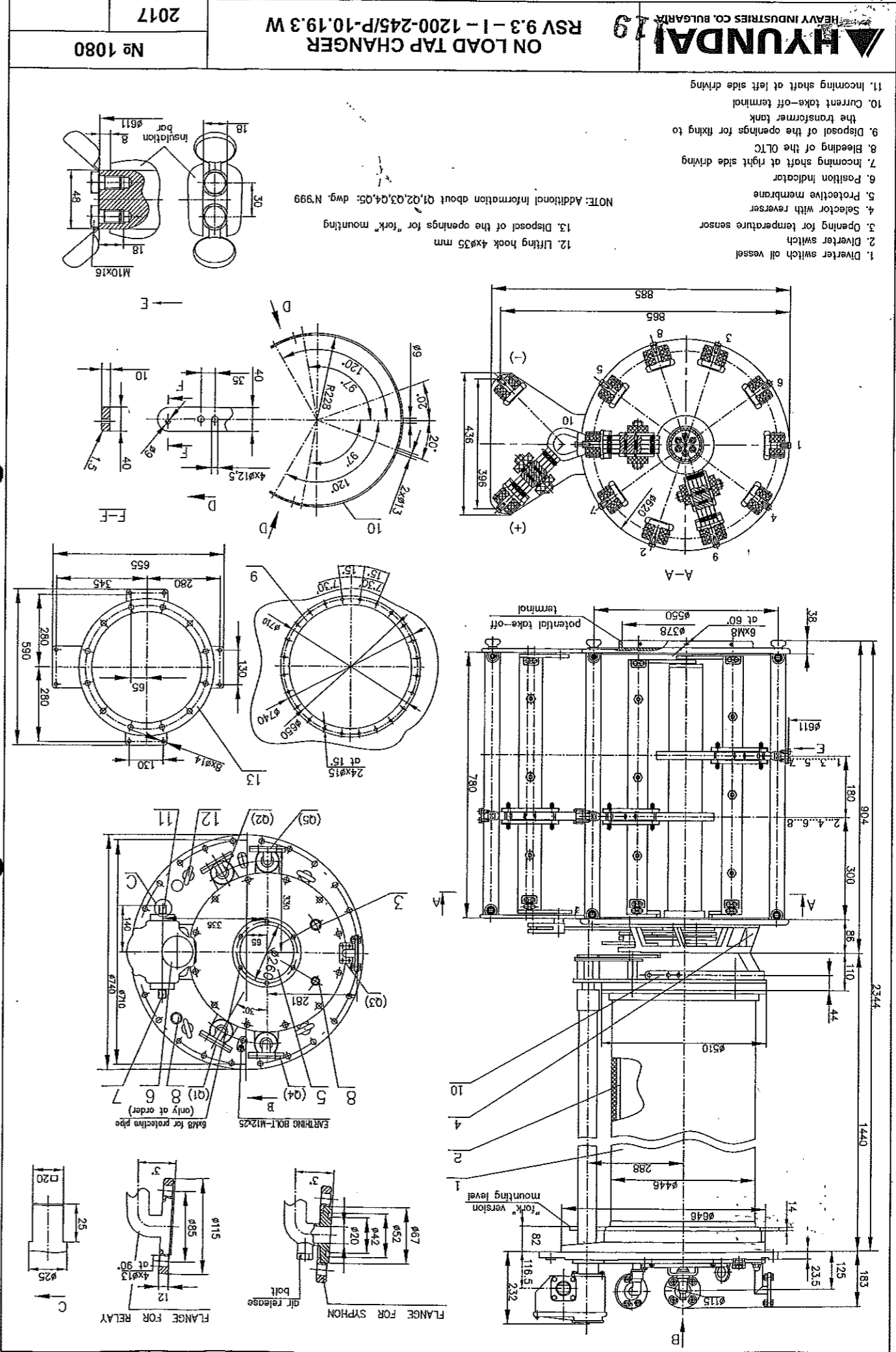
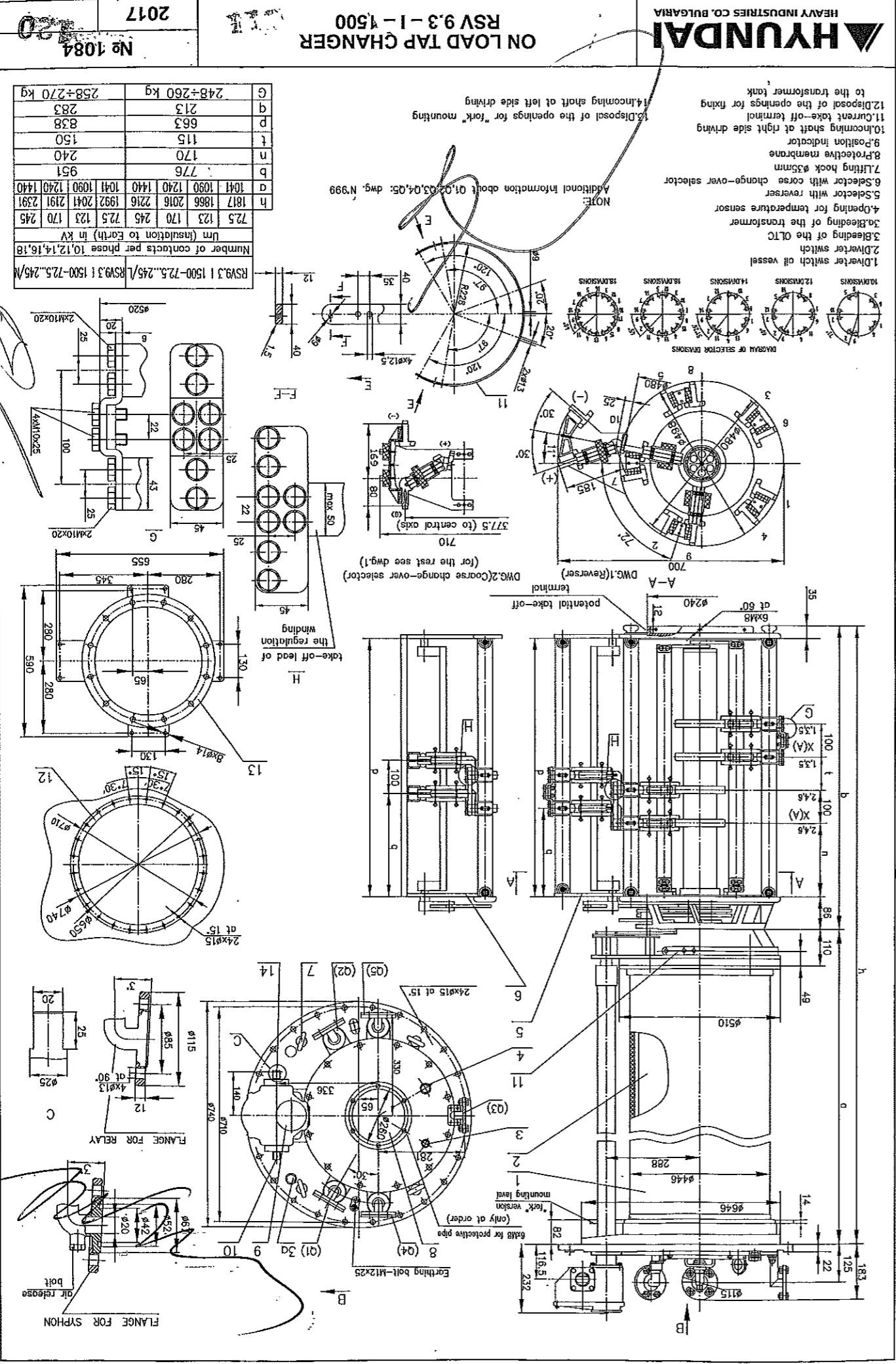


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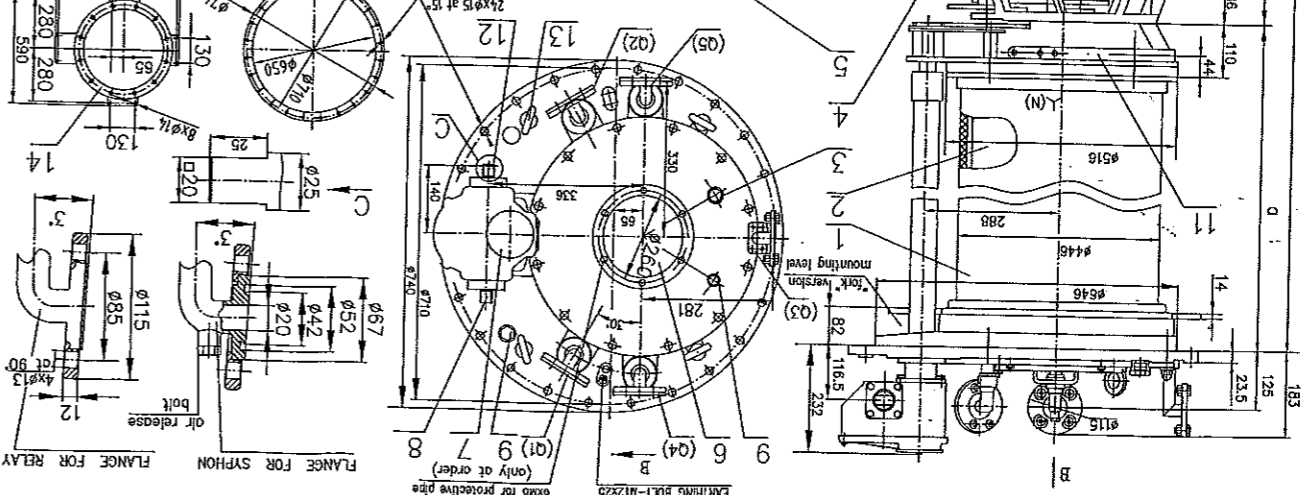
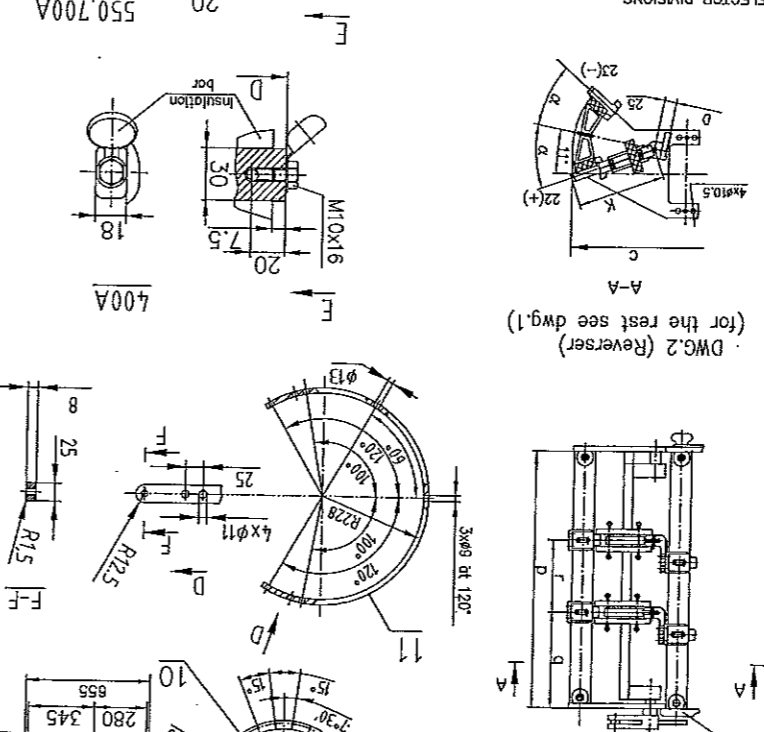
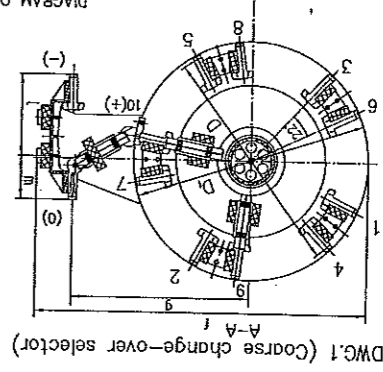
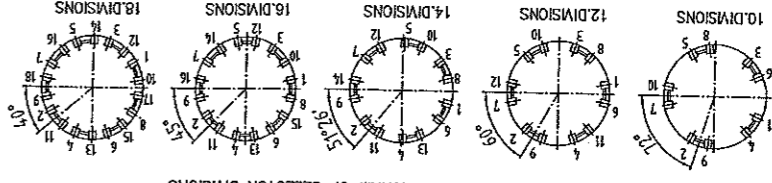






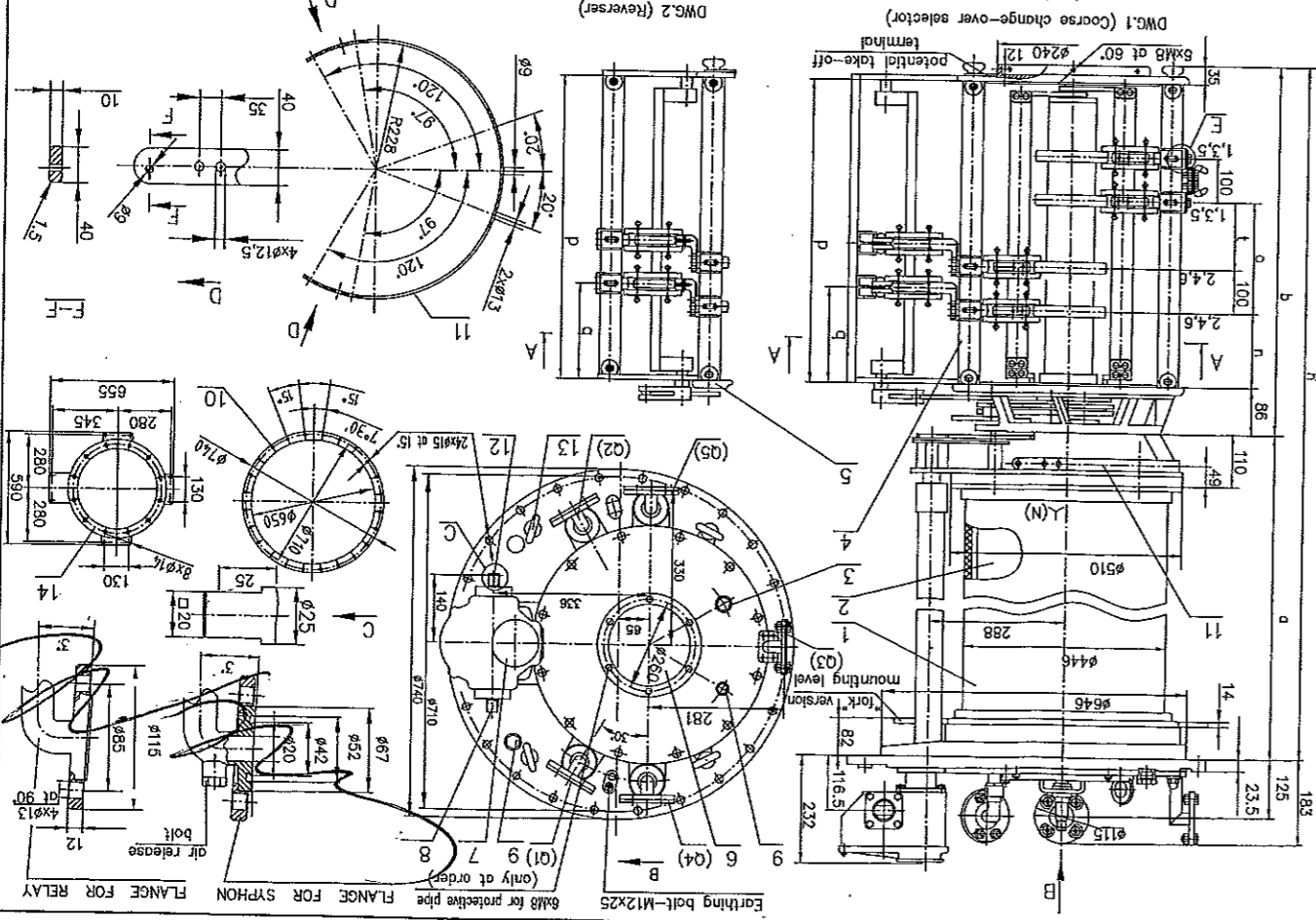
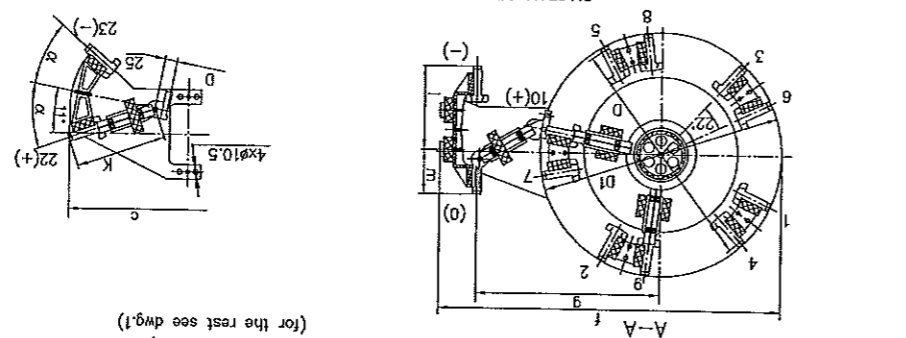
- NOTE: 1) Horizontal dimensions of "K" and "L" (16,18 div.) are same as selector sizes "M" and "N".  
2) We are offering OLTC's without change-over selector are same as selector sizes "M" and "N".  
3) Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N.999
1. Divertor switch oil vessel
  2. Divertor switch
  3. Opening for temperature sensor
  4. Selector with coarse change-over selector
  5. Selector with reverser
  6. Protective membrane
  7. Position indicator
  8. Incoming shaft of right side driving the transformer tank
  9. Bleeding of the OLTC
  10. Disposal of the openings for fixing to the transformer tank
  11. Current take-off terminal
  12. Incoming shaft of left side driving
  13. Lifting hook 4x35 mm
  14. Disposal of the openings for "fork" mounting

| Number of contacts per phase 10,12,14,16,18 |                           | Um (nominal to earth) in KV |                           |
|---|---------------------------|-----------------------------|---------------------------|
| RSV9.3 II 400-72.5, 123/K                   | RSV9.3 II 550-72.5, 170/A | RSV9.3 II 700-72.5, 245/M   | RSV9.3 II 700-72.5, 245/N |
| 245   | 245                       | 245                         | 245                       |
| 170   | 170                       | 170                         | 170                       |
| 123   | 123                       | 123                         | 123                       |
| 72.5  | 72.5                      | 72.5                        | 72.5                      |
| 1621  | 1671                      | 1746                        | 1796                      |
| 1821  | 1871                      | 1946                        | 1996                      |
| 1240  | 1290                      | 1365                        | 1415                      |
| 1090  | 1140                      | 1215                        | 1265                      |
| 891   | 941                       | 1016                        | 1066                      |
| 155   | 160                       | 175                         | 180                       |
| 115   | 120                       | 130                         | 135                       |
| 531   | 581                       | 656                         | 706                       |
| 223-230 kg                                  | 228-236 kg                | 232-241 kg                  | 237-247 kg                |



- NOTE: 1) Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N.999  
2) We are offering OLTC's without change-over selector are same as selector sizes "M".  
3) Horizontal dimensions of "L" (16,18 div.) are same as selector sizes "N".
1. Divertor switch oil vessel
  2. Divertor switch
  3. Opening for temperature sensor
  4. Selector with coarse change-over selector
  5. Selector with reverser
  6. Protective membrane
  7. Position indicator
  8. Incoming shaft of right side driving the transformer tank
  9. Bleeding of the OLTC
  10. Disposal of the openings for fixing to the transformer tank
  11. Current take-off terminal
  12. Incoming shaft of left side driving
  13. Lifting hook 4x35 mm
  14. Disposal of the openings for "fork" mounting

| Number of contacts per phase 10,12,14,16,18 |                   | Um (nominal to earth) in KV |                   |
|---|-------------------|-----------------------------|-------------------|
| RSV9.3 - I - 1200                           | RSV9.3 - I - 1200 | RSV9.3 - I - 1200           | RSV9.3 - I - 1200 |
| 245   | 245               | 245                         | 245               |
| 170   | 170               | 170                         | 170               |
| 123   | 123               | 123                         | 123               |
| 72.5  | 72.5              | 72.5                        | 72.5              |
| 1747  | 1797              | 1872                        | 1922              |
| 1947  | 1997              | 2072                        | 2122              |
| 1240  | 1290              | 1365                        | 1415              |
| 1090  | 1140              | 1215                        | 1265              |
| 871   | 921               | 996                         | 1046              |
| 155   | 160               | 175                         | 180               |
| 115   | 120               | 130                         | 135               |
| 531   | 581               | 656                         | 706               |
| 240 + 250 kg                                | 245 + 250 kg      | 250 + 260 kg                | 255 + 260 kg      |



- NOTE: 1) Horizontal dimensions of "K" and "L" (16,18 div.) are same as selector sizes "M" and "N".  
2) We are offering O.L.T.C.'s without change-over selector  
3) Additional information about Q1, Q2, Q3, Q4, Q5: dwg. N.999
1. Diverter switch oil vessel
  2. Diverter switch
  3. Opening for temperature sensor
  4. Selector with coarse change-over selector
  5. Selector with reverser
  6. Protective membrane
  7. Position indicator
  8. Incoming shaft at right side driving
  9. Bleeding of the O.L.T.C
  10. Disposal of the openings for fixing to the transformer tank
  11. Current take-off terminal
  12. Incoming shaft at left side driving
  13. Lifting hook 4x35 mm
  14. Disposal of the openings for "fork" mounting

| h | Number of contacts per phase 10,12,14,16,18 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
|---|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|   | 10  | 12         | 14         | 16         | 18         | 20         | 22         | 24         | 26         | 28         | 30         | 32         | 34         | 36         | 38         | 40         |
| a | 791   | 980        | 1170       | 1360       | 1550       | 1740       | 1930       | 2120       | 2310       | 2500       | 2690       | 2880       | 3070       | 3260       | 3450       | 3640       |
| b | 411   | 506        | 601        | 696        | 791        | 886        | 981        | 1076       | 1171       | 1266       | 1361       | 1456       | 1551       | 1646       | 1741       | 1836       |
| c | 170   | 170        | 170        | 170        | 170        | 170        | 170        | 170        | 170        | 170        | 170        | 170        | 170        | 170        | 170        | 170        |
| d | 123   | 123        | 123        | 123        | 123        | 123        | 123        | 123        | 123        | 123        | 123        | 123        | 123        | 123        | 123        | 123        |
| e | 140   | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        |
| f | 148   | 148        | 148        | 148        | 148        | 148        | 148        | 148        | 148        | 148        | 148        | 148        | 148        | 148        | 148        | 148        |
| g | 297   | 297        | 297        | 297        | 297        | 297        | 297        | 297        | 297        | 297        | 297        | 297        | 297        | 297        | 297        | 297        |
| h | 550   | 550        | 550        | 550        | 550        | 550        | 550        | 550        | 550        | 550        | 550        | 550        | 550        | 550        | 550        | 550        |
| i | 300   | 300        | 300        | 300        | 300        | 300        | 300        | 300        | 300        | 300        | 300        | 300        | 300        | 300        | 300        | 300        |
| j | 192,5                                       | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      | 192,5      |
| k | 65  | 65         | 65         | 65         | 65         | 65         | 65         | 65         | 65         | 65         | 65         | 65         | 65         | 65         | 65         | 65         |
| l | 138   | 138        | 138        | 138        | 138        | 138        | 138        | 138        | 138        | 138        | 138        | 138        | 138        | 138        | 138        | 138        |
| m | 140   | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        | 140        |
| n | 35  | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35         |
| o | 203-210 kg                                  | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg | 203-210 kg |
| p | 208-216 kg                                  | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg | 208-216 kg |
| q | 212-221 kg                                  | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg | 212-221 kg |
| r | 217-227 kg                                  | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg | 217-227 kg |

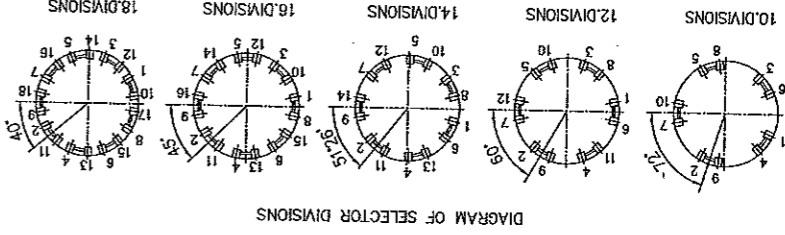
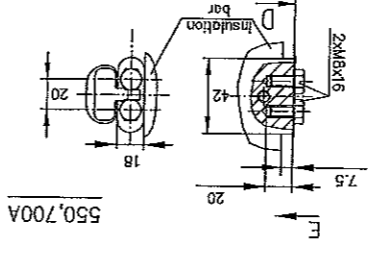
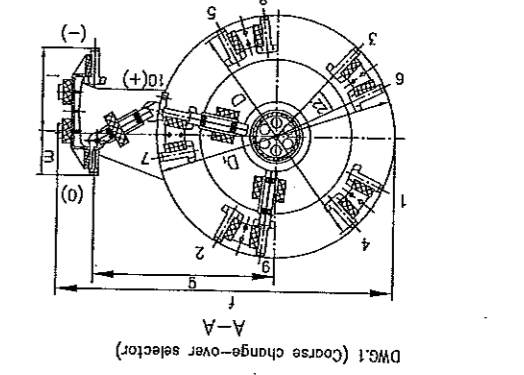


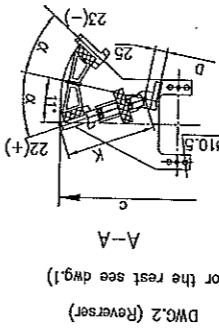
DIAGRAM OF SELECTOR DIVISIONS



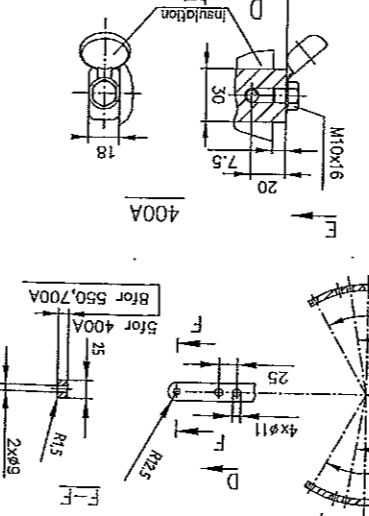
550,700A



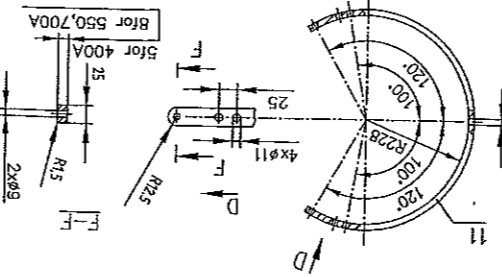
DWG.1 (Coarse change-over selector)



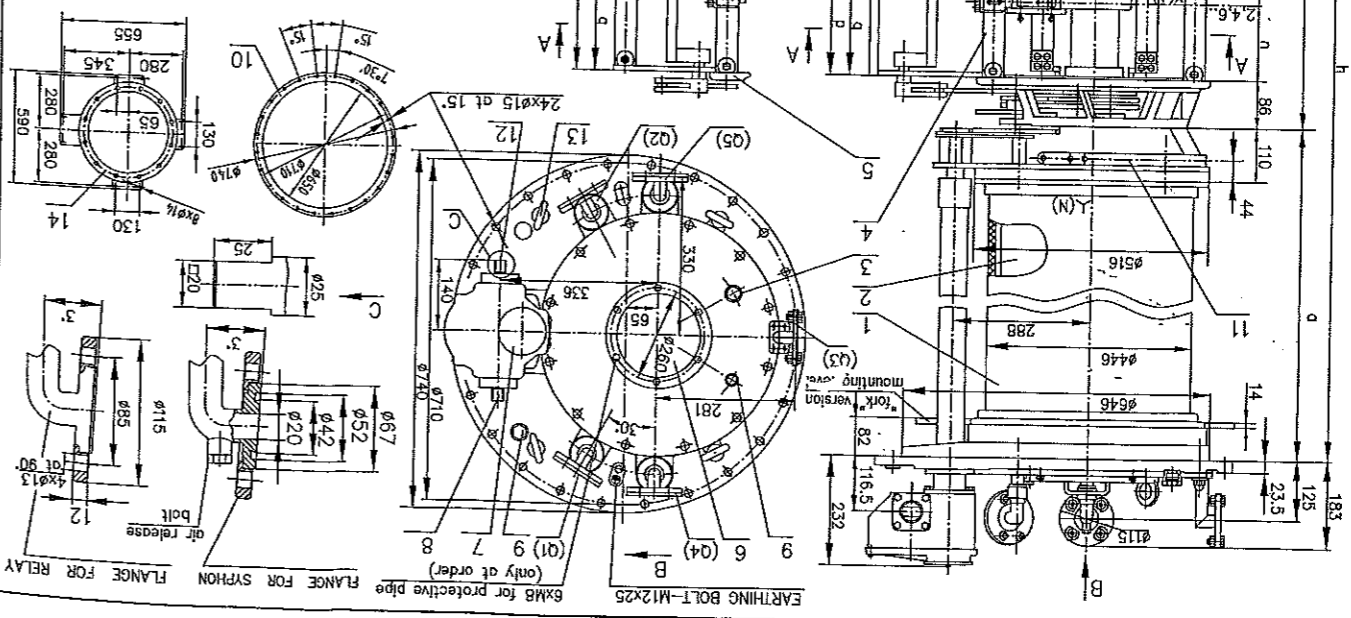
DWG.2 (Reverser)



400A



550,700A



FLANGE FOR RELAY

FLANGE FOR RELAY

- NOTE: 1) We are offering O.L.T.C.'s without change-over selector  
2) Additional information about Q1, Q2, Q3, Q4, Q5: dwg. N.999  
3) Selectors with 16 divisions are used only for currents of 400A
1. Diverter switch oil vessel
  2. Diverter switch
  3. Opening for temperature sensor
  4. Selector with coarse change-over selector
  5. Selector with reverser
  6. Protective membrane
  7. Position indicator
  8. Incoming shaft at right side driving
  9. Bleeding of the O.L.T.C
  10. Disposal of the openings for fixing to the transformer tank
  11. Current take-off terminal
  12. Incoming shaft at left side driving
  13. Lifting hook 4x35 mm
  14. Disposal of the openings for "fork" mounting

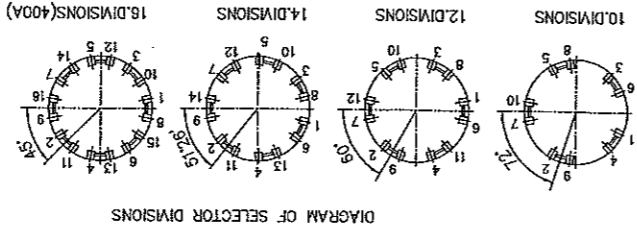
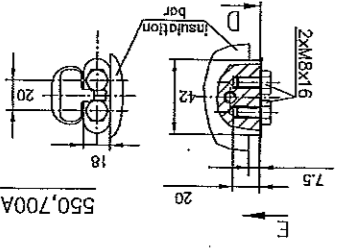
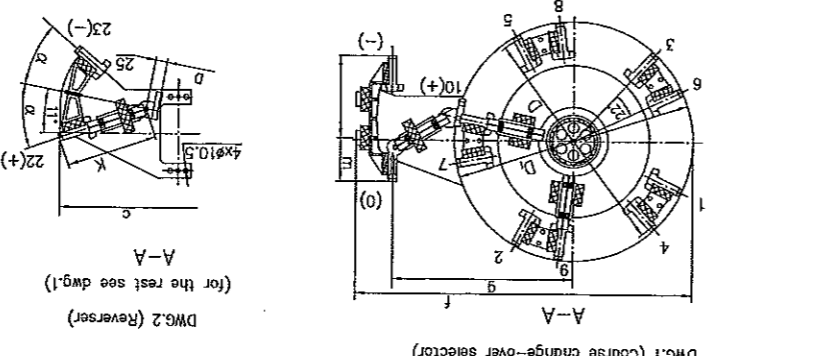


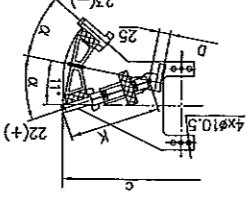
DIAGRAM OF SELECTOR DIVISIONS



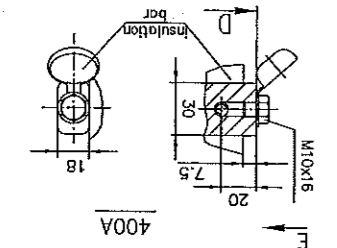
550,700A



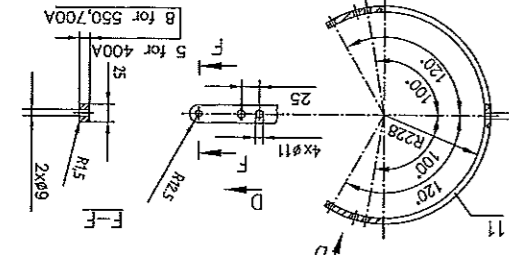
DWG.1 (Coarse change-over selector)



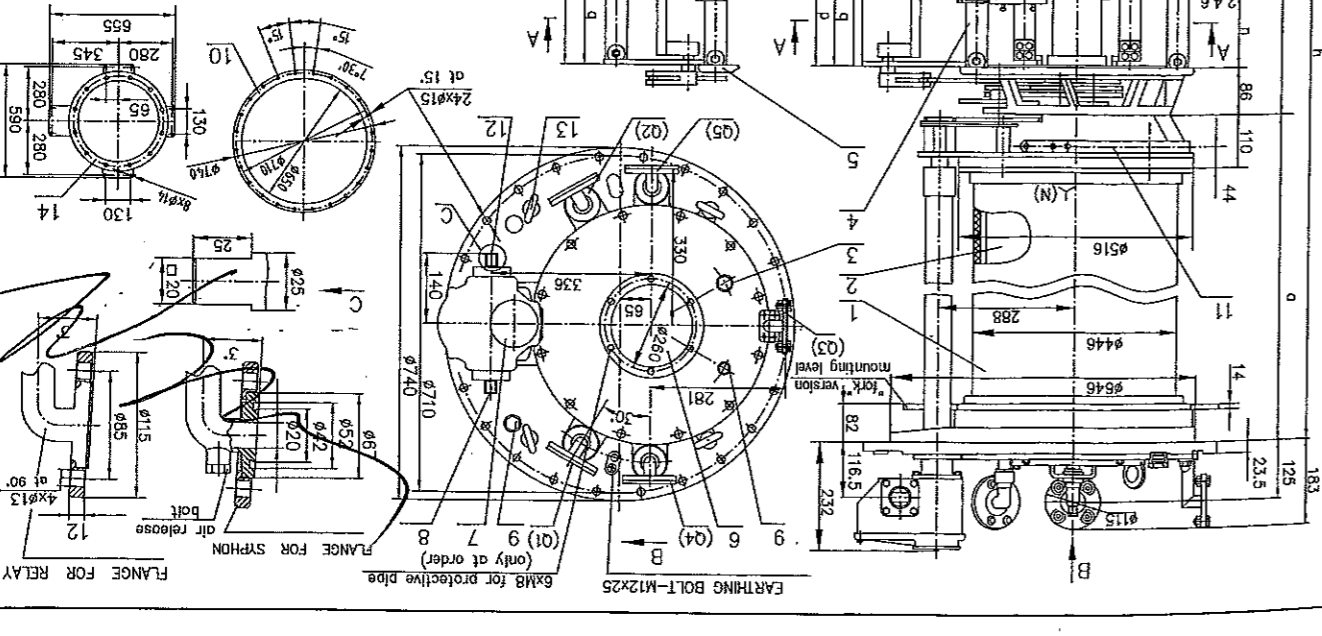
DWG.2 (Reverser)



400A



550,700A



FLANGE FOR RELAY

FLANGE FOR RELAY



RSV 9.3 - III - 400/550/700 OLTCs

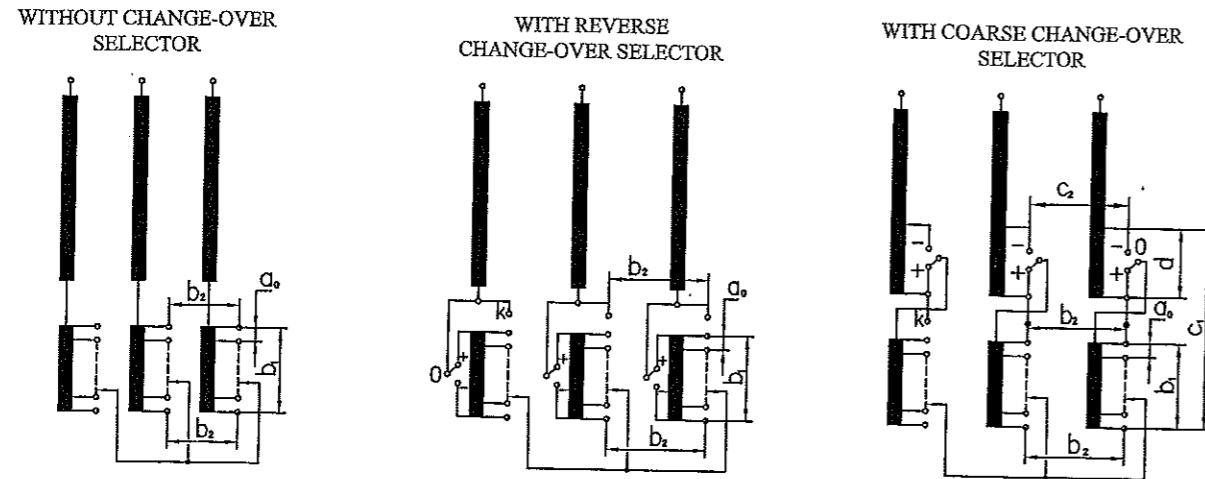


Fig. 2: Insulation distances of the transformer windings

RSV 9.3 - I - 400/550/700/1200/1500 OLTCs

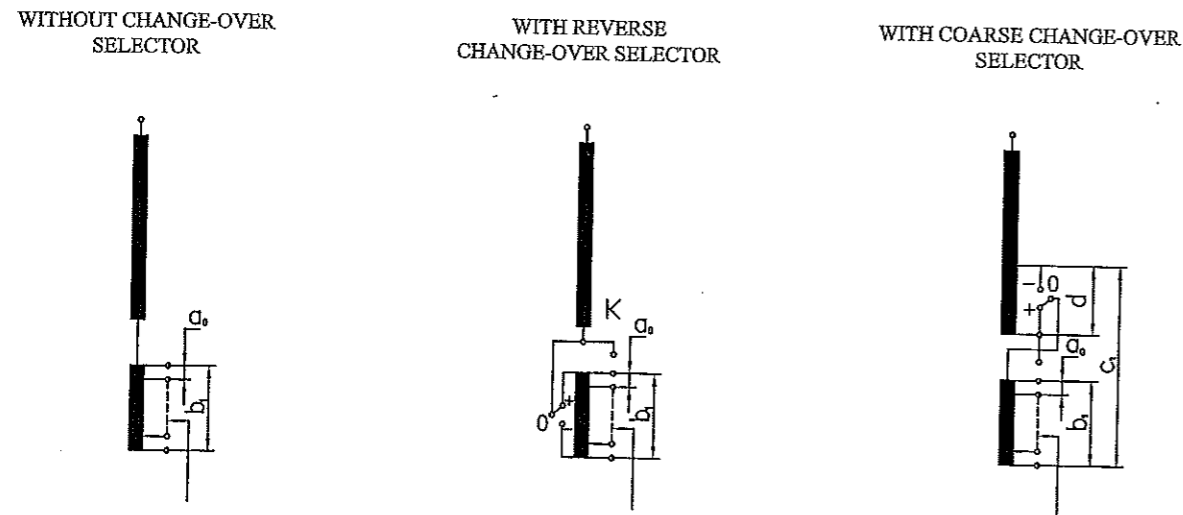


Fig. 3: Insulation distances of the transformer windings

Table 4: Rated withstand voltages

| Insulation distances | Rated withstand voltages (kV) |            |                       |            |                       |            |                       |            |                       |            |
|----------------------|-------------------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|
|                      | Tap selector size - K         |            | Tap selector size - L |            | Tap selector size - M |            | Tap selector size - N |            | Tap selector size - P |            |
|                      | 1,2/50 $\mu$ s                | 50 Hz 1min | 1,2/50 $\mu$ s        | 50 Hz 1min | 1,2/50 $\mu$ s        | 50 Hz 1min | 1,2/50 $\mu$ s        | 50 Hz 1min | 1,2/50 $\mu$ s        | 50 Hz 1min |
| a <sub>0</sub>       | 100                           | 25         | 120                   | 35         | 130                   | 40         | 130                   | 40         | 140                   | 40         |
| b <sub>1</sub>       | 230                           | 55         | 290                   | 80         | 340                   | 100        | 410                   | 120        | 490                   | 140        |
| b <sub>2</sub>       | 230                           | 55         | 290                   | 80         | 340                   | 100        | 410                   | 120        | 490                   | 140        |
| c <sub>1</sub>       | 290                           | 65         | 390                   | 120        | 450                   | 130        | 520                   | 150        | -                     | -          |
| c <sub>2</sub>       | 290                           | 65         | 390                   | 120        | 450                   | 130        | 520                   | 150        | -                     | -          |
| d                    | 290                           | 80         | 290                   | 80         | 410                   | 120        | 410                   | 120        | 490                   | 140        |

2. Review of the RSV 9.3 types  
2.1. Main dimensions<sup>1)</sup>

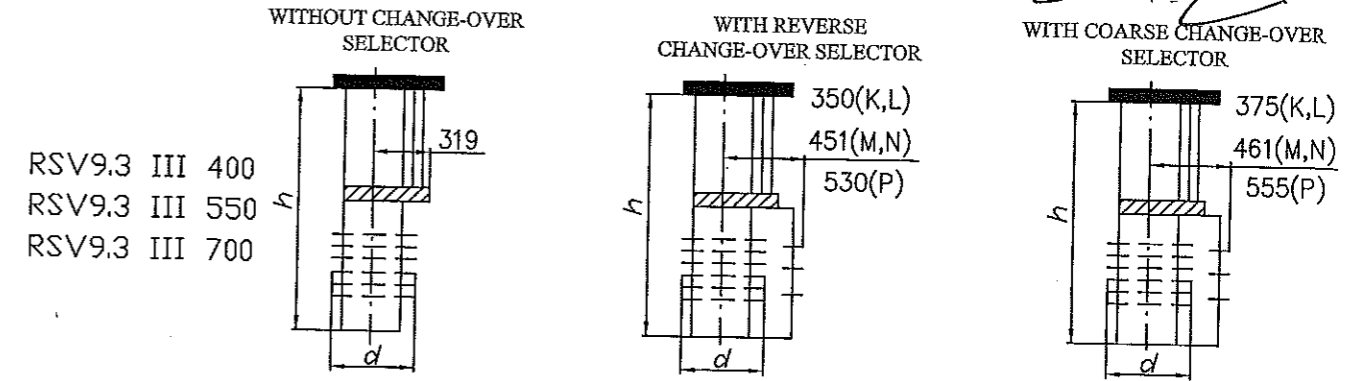


Fig. 4: RSV 9.3 - III

Table 5: RSV 9.3 - III

| Um      | Insulation level of the selector |     |      |     |      |     |      |     |      |     |
|---------|----------------------------------|-----|------|-----|------|-----|------|-----|------|-----|
|         | K                                |     | L    |     | M    |     | N    |     | P    |     |
|         | h                                | d   | h    | d   | h    | d   | h    | d   | h    | d   |
| 72.5 kV | 1741                             | 386 | 1896 | 386 | 2011 | 480 | 2201 | 480 | 2514 | 558 |
| 123 kV  | 1791                             | 386 | 1946 | 386 | 2061 | 480 | 2251 | 480 | 2564 | 558 |
| 170 kV  | -                                | -   | 2102 | 386 | 2217 | 480 | 2407 | 480 | 2720 | 558 |
| 245 kV  | -                                | -   | -    | -   | 2317 | 480 | 2507 | 480 | 2820 | 558 |

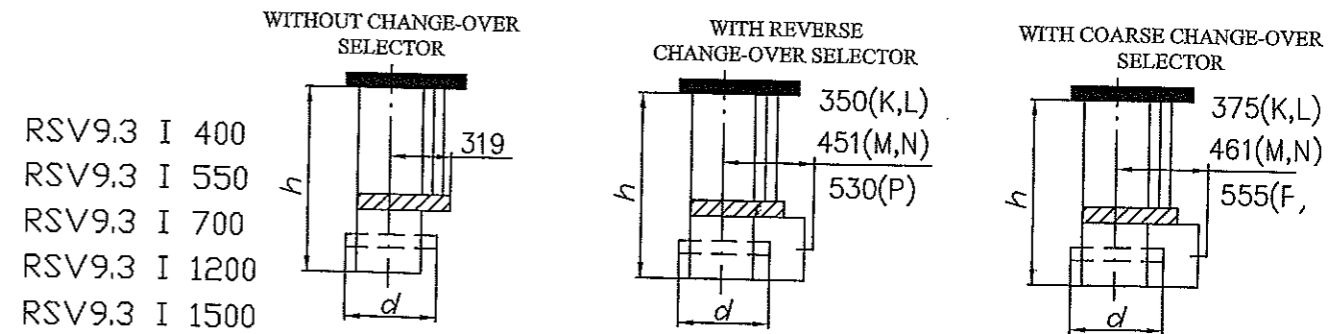


Fig. 5: RSV 9.3 - I

Table 6: RSV 9.3 - I

| Um      | Insulation level of the selector |     |      |     |      |     |      |     |      |     |
|---------|----------------------------------|-----|------|-----|------|-----|------|-----|------|-----|
|         | K                                |     | L    |     | M    |     | N    |     | P    |     |
|         | h                                | d   | h    | d   | h    | d   | h    | d   | h    | d   |
| 72.5 kV | 1202                             | 386 | 1297 | 386 | 1352 | 480 | 1462 | 480 | 1695 | 558 |
| 123 kV  | 1401                             | 386 | 1496 | 386 | 1551 | 480 | 1661 | 480 | 1894 | 558 |
| 170 kV  | -                                | -   | 1596 | 386 | 1651 | 480 | 1761 | 480 | 1994 | 558 |
| 245     | -                                | -   | -    | -   | 1751 | 480 | 1861 | 480 | 2094 | 558 |

1) For the rest of the dimensions see appendices

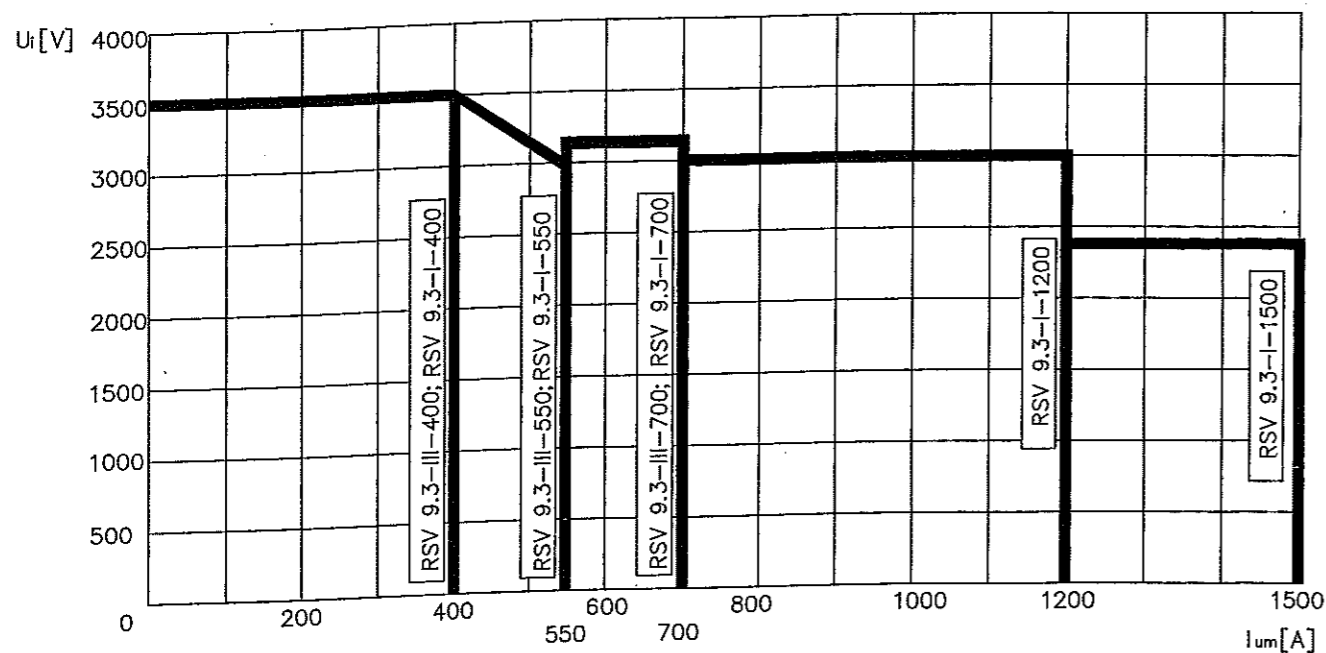
**1.2. Rated through current ( $I_u$ ), rated step voltages ( $U_i$ ), rated step capacity ( $P_{stN}$ )**

Table 2 shows the maximum values of  $I_u$ , the corresponding step voltage  $U_i$  and the rated step capacity  $P_{stN}$ .

**Table 2: Maximum rated through current ( $I_{um}$ ), rated step voltages ( $U_i$ ), rated step capacity ( $P_{stN}$ )**

| OLTC            | RSV 9.3 – III |      |      | RSV 9.3 – I |      |      |      |      |
|-----------------|---------------|------|------|-------------|------|------|------|------|
|                 | 400           | 550  | 700  | 400         | 550  | 700  | 1200 | 1500 |
| $I_{um}$ (A)    | 400           | 550  | 700  | 400         | 550  | 700  | 3000 | 2300 |
| $U_i$ (V)       | 3500          | 3000 | 3200 | 3500        | 3000 | 3200 | 3600 | 3450 |
| $P_{stN}$ (kVA) | 1400          | 1650 | 2240 | 1400        | 1650 | 2240 | 3600 | 3450 |

The rated through current  $I_u$  and its corresponding rated step voltage  $U_i$  are determined by the curve of the rated step capacity (Fig. 1).



**Fig. 1: Step capacities (rated through current  $I_u$  [A]; rated step voltages  $U_i$  [V])**

In case of overexcitation of the transformer, the maximum step voltage can be increased with 10 % under the condition that the step capacity is limited to its rated value.

The specific commutation regimes are clarified in the technical data catalog for all HHIB OLTCs.

**1.3. Electrical and mechanical endurance**

Table 3 gives the average values for the number of switching operations till inspection of the diverter switch and replacement of the vacuum interrupter. These values have been obtained as a result of experimenting with real loads under maximum rated through current  $I_{um}$  (A), rated step voltage  $U_i$  (V) and  $\cos\phi = 1$ .

**Table 3: Electrical and mechanical endurance**

| OLTC   | RSV 9.3 – III, RSV 9.3 – I |         |         | RSV9.3 – I |         |
|--|----------------------------|---------|---------|------------|---------|
|  | 400 A                      | 550 A   | 700 A   | 1200 A     | 1500 A  |
| Number of switching operations till inspection                         | 300 000                    | 300 000 | 250 000 | 150 000    | 150 000 |
| Number of switching operations till replacement of vacuum interrupters | 600 000                    | 500 000 | 500 000 | 500 000    | 300 000 |
| Mechanical endurance – number of switching operations                  | 1 200 000                  |         |         | 800 000    | 800 000 |

Detailed information about the number of switching operations till inspection for the different tap changers is given in the RS 9.3/RSV 9.3 Installation and Operation Manual.

**1.4. Insulation level**

The insulation level of the OLTC is determined by a number of withstand voltage values.

The rated withstand voltage values to earth are given in Table 1. These voltages are determined by national and international standards.

The internal insulation is dimensioned depending on the voltages defined by the transformer winding taps to the different parts of the selector, change-over selector and the diverter switch.

Fig. 2 and 3 show the main connection diagrams and the typical insulation distances to them.

The withstand voltage values from the different insulation distances are given in Table 4. For a correct OLTC selection, these voltage values should correspond to the voltage values that occur during the lightning impulse test, the induced voltage test and the power frequency voltage test of the transformer. The least favorable position of the OLTC should be taken into account.

The insulation to earth and the tap selector insulation size are not mutually connected and can be selected in accordance with the specific requirements.

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**Notes:**

- 1) This technical data catalog is intended to be used by transformer designers as well as other technical personnel responsible for maintenance, diagnostics and operation of OLTCs.
- 2) HHI-Bulgaria reserves the right to make changes in the overall dimension drawings and connection diagrams without prior notice. Updated drawings are provided as part of the technical documentation received by the customer at the time of the product delivery; updated drawings can be provided also to potential customers on request.
- 3) The OLTC is manufactured according to the specific data in the order specification sheet filled in by the client.
- 4) HHI-Bulgaria is not responsible for the client's improper selection of an OLTC.

**1. Basic characteristics**

The OLTCs of Hyundai Heavy Industries Co. Bulgaria (HHIB) meet the requirements of the IEC 60214-1 standard.

**1.1. Basic technical data**

**Table 1**

| OLTC type   |  | RSV 9.3<br>III – 400  | RSV 9.3<br>III – 550 | RSV 9.3<br>III – 700 | RSV 9.3*<br>I – 400                   | RSV 9.3<br>I – 550       | RSV 9.3<br>I – 700 | RSV 9.3<br>I – 1200 | RSV 9.3<br>I – 1500 |                   |                   |     |     |     |     |
|---|--|---|----------------------|----------------------|---------------------------------------|--------------------------|--------------------|---------------------|---------------------|-------------------|-------------------|-----|-----|-----|-----|
| Number of phases and application  |  | 3 – in the neutral  |                      |                      | 1 phase – at any point on the winding |                          |                    |                     |                     |                   |                   |     |     |     |     |
| Maximum rated through current (A)   |  | 400   | 550                  | 700                  | 400                                   | 550                      | 700                | 1200                | 1500                |                   |                   |     |     |     |     |
| Short circuit withstand current (kA)  | R.m.s. value (3 s duration)  | 6   | 8                    | 10                   | 6                                     | 8                        | 10                 | 15                  | 15                  |                   |                   |     |     |     |     |
|   | Peak value   | 15  | 20                   | 25                   | 15                                    | 20                       | 25                 | 37,5                | 37,5                |                   |                   |     |     |     |     |
| Maximum rated step voltage per phase (V)  |  | 3500  | 3000                 | 3200                 | 3500                                  | 3000                     | 3200               | 3000                | 2300                |                   |                   |     |     |     |     |
| Rated step capacity (kVA)   |  | 1400  | 1650                 | 2240                 | 1400                                  | 1650                     | 2240               | 3600                | 3450                |                   |                   |     |     |     |     |
| Rated frequency (Hz)  |  | 50...60   |                      |                      |                                       |                          |                    |                     |                     |                   |                   |     |     |     |     |
| Insulation to earth   | Highest voltage for equipment U <sub>m</sub> (kV,r.m.s.) <sup>1)</sup> | 72.5  | 123                  | 170                  | 245                                   | 300                      |                    |                     |                     |                   |                   |     |     |     |     |
|   | Rated separate source AC withstand voltage, 1min duration (kV, r.m.s.) | 140   | 230                  | 325                  | 460                                   | 460                      |                    |                     |                     |                   |                   |     |     |     |     |
|   | Rated switching impulse withstand voltage (kV, 250/2500 μs)            | -   | -                    | -                    | 850                                   | 850                      |                    |                     |                     |                   |                   |     |     |     |     |
|   | Rated lightning impulse withstand voltage (kV, 1,2/50 μs)              | 350   | 550                  | 750                  | 1050                                  | 1050                     |                    |                     |                     |                   |                   |     |     |     |     |
| Number of operating positions   |  | Without change-over selector – max. of 18<br>With change-over selector – max. of 35   |                      |                      |                                       |                          |                    |                     |                     |                   |                   |     |     |     |     |
| Tap selector  |  | Five tap selector sizes (K, L, M, N, P) are available corresponding to the requirements of the voltage stress across the regulating winding. The tap selector insulation level can be chosen independently from the maximum operating voltage to earth. For the test voltages, see Section 1.4. |                      |                      |                                       |                          |                    |                     |                     |                   |                   |     |     |     |     |
| Oil pressure in the diverter switch oil compartment   |  | Operating oil pressure up to 0,3x10 <sup>5</sup> Pa (testing pressure – 0,6x10 <sup>5</sup> Pa). Vacuum-proof for drying.   |                      |                      |                                       |                          |                    |                     |                     |                   |                   |     |     |     |     |
| Siphon for draining the oil from the diverter switch oil compartment                                    |  | Basic design – left or right  |                      |                      |                                       |                          |                    |                     |                     |                   |                   |     |     |     |     |
| Drying  |  | In vacuum furnace – up to 110° C<br>In kerosene vapour – up to 125° C   |                      |                      |                                       |                          |                    |                     |                     |                   |                   |     |     |     |     |
| OLTC type   |  | RSV 9.3<br>III-400/550/700  |                      |                      |                                       | RSV 9.3<br>I-400/550/700 |                    |                     |                     | RSV 9.3<br>I-1200 | RSV 9.3<br>I-1500 |     |     |     |     |
| Tap selector sizes  |  | K   | L                    | M                    | N                                     | K                        | L                  | M                   | N                   | P                 | L                 | N   | P   | L   | N   |
| Weight in kg (approximately)  |  | 268   | 272                  | 278                  | 286                                   | 218                      | 224                | 229                 | 235                 | 245               | 258               | 273 | 283 | 260 | 275 |
| Displacement volume in dm <sup>3</sup> (approx.)  | 72,5 kV  | 168   | 173                  | 178                  | 188                                   | 148                      | 153                | 158                 | 163                 | 168               | 170               | 180 | 187 | 172 | 182 |
|   | 123 kV   | -   | 183                  | 188                  | 198                                   | 158                      | 163                | 168                 | 173                 | 178               | 180               | 190 | 197 | 182 | 192 |
|   | 170 kV   | -   | 193                  | 198                  | 208                                   | -                        | 183                | 188                 | 193                 | 198               | 200               | 210 | 227 | 202 | 212 |
|   | 245 kV   | -   | -                    | 213                  | 223                                   | -                        | -                  | 208                 | 213                 | 218               | 220               | 230 | 237 | 222 | 232 |
| Oil filling quantity of the diverter switch oil compartment V <sub>s</sub> in dm <sup>3</sup> (approx.) | 72,5 kV  | 130   |                      |                      |                                       | 110                      |                    |                     |                     | 130               |                   |     |     |     |     |
|   | 123 kV   | 140   |                      |                      |                                       | 125                      |                    |                     |                     | 140               |                   |     |     |     |     |
|   | 170 kV   | 160   |                      |                      |                                       | 140                      |                    |                     |                     | 160               |                   |     |     |     |     |
|   | 245 kV   | 175   |                      |                      |                                       | 155                      |                    |                     |                     | 175               |                   |     |     |     |     |
|   | 300 kV   | 185   |                      |                      |                                       | 165                      |                    |                     |                     | 185               |                   |     |     |     |     |

1) In accordance with IEC 60214-1, chapter 3.60 highest effective value for phase-to-phase voltage in a three-phase system for which an on-load tap-changer is designed with respect to its insulation.

\* Suitable for operation in natural esters - Envirotemp FR3 fluid

- Notes:**
1. Minimum volume of the conservator, considering the temperature oil expansion when the temperature changes from -30° C to +100° C: ΔV = 0,1V<sub>s</sub> + 5 (dm<sup>3</sup>).
  2. The RSV 9.3 OLTC can operate with a rated load at oil temperature from -25° C to +105° C.

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**ON LOAD TAP CHANGERS  
RSV 9.3  
TECHNICAL DATA**

**Hyundai Heavy Industries  
Co. Bulgaria**

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2017-2

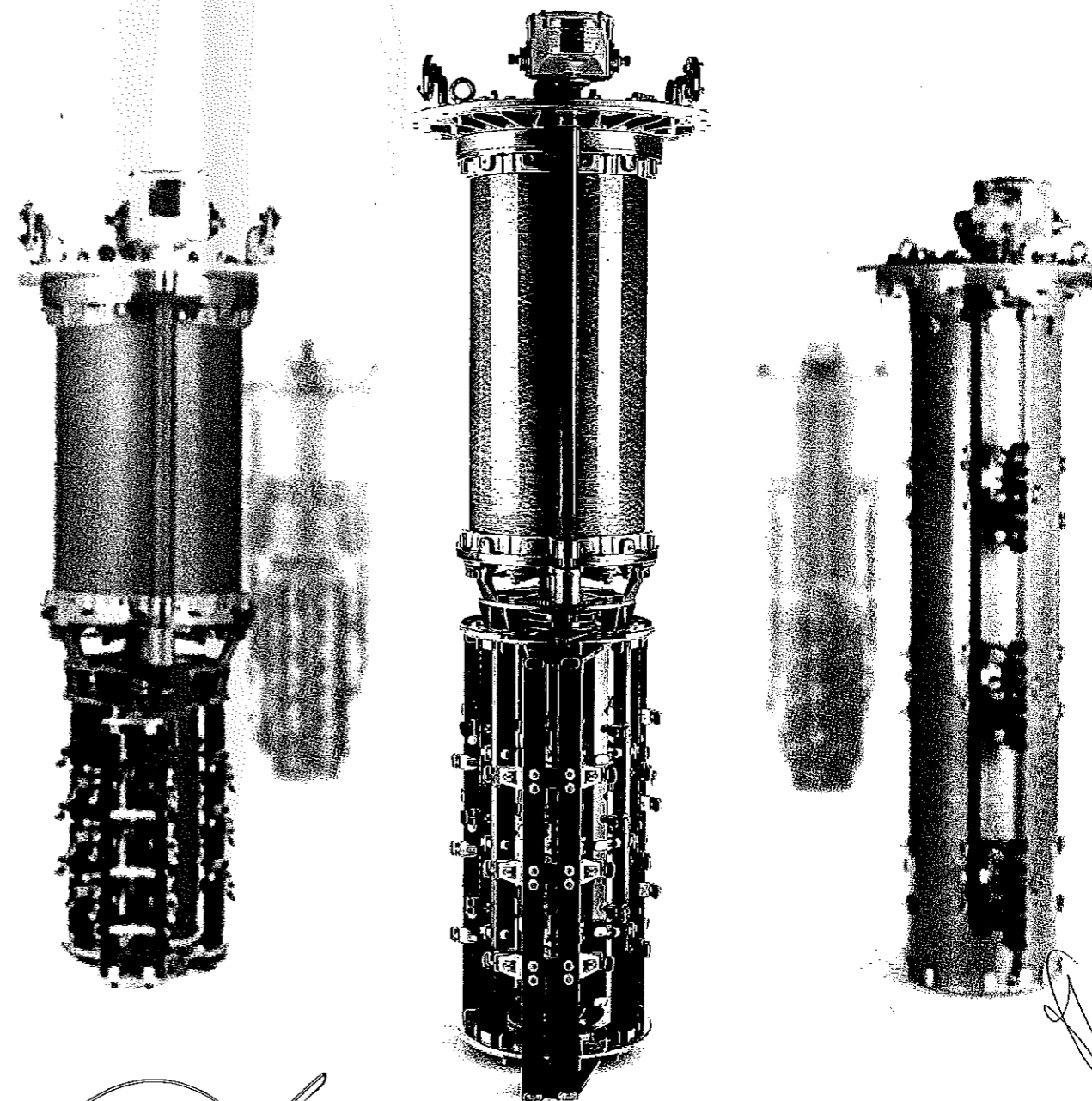
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ON LOAD TAP CHANGERS  
**TYPE RSV 9.3**

ON LOAD TAP CHANGERS  
**TYPE RSV 9.3**

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