

## Automation Transformers - Non-Ventilated 50 VA to 45 kVA

SolaHD encapsulated transformers are rated for hazardous locations as well as harsh industrial environments. Encapsulation and rugged UL Listed/NEMA Type 3R enclosures protect the transformer from dust, moisture, and provides extra shock and vibration resistance. SolaHD transformers fully comply with the latest edition of the National Electrical Code for Class I, Division 2, Group A, B, C and D locations when installed in compliance with NEC 501.100 (B).

### Features

#### Single Phase: .05 – .250 kVA

- UL Listed/NEMA Type 3R non encapsulated enclosure for indoor and outdoor service
- Low temperature rise, UL Class I30 °C insulation system, 80 °C temperature rise under full load
- Conduit knockouts for side entry into wiring compartment
- Copper lead wire terminations

#### Single Phase: 0.500 – 25 kVA

#### Three Phase: 3 – 45 kVA

- Available as standard in Cold Rolled Steel or Painted Stainless Steel
- UL Listed/NEMA Type 3R encapsulated enclosure for indoor and outdoor service
- Electrostatically shielded for quality power on sizes 1 kVA and larger
- UL Class 200°C insulation system, 115°C temperature rise under full load
- Conduit knockouts for side entry into wiring compartment (Type 3R versions only)
- Copper lead wire terminations
- .500 - 45 kVA units are encapsulated with electrical grade silica and epoxy for industrial applications

### Related Products

- Some SolaHD DC power supplies are available with Class I, Division 2 ratings or encapsulation.
- Surge Protective Devices



### Certifications and Compliances

#### All Models

- cULus Listed: E25872, E77014
  - UL 1561 or UL 5085-1, UL 5085-2
  - CSA C22.2 No. 47 or No. 66
  - RoHS Compliant

#### Group 5, Export Models

- CE Low Voltage Directive
  - IEC 61558-1, IEC 61558-2-4

### Accessories and Optional Design Styles

- Other enclosure styles available (contact Technical Support for details):
  - 316 Stainless Steel
  - Copper Wound designs
- UL Listed/NEMA Type 4/12 or 4X Encapsulated Enclosures
- Low temperature designs available
- cULus Listed E361435 transformers for Class I, Division 2/Zone 2 hazardous locations are available as custom designs.

Note: Weights and dimensions may change and should not be used for construction purposes.

## Selection Table: Single Phase

### Group 1: 240 x 480 Primary, 120/240 Secondary, 60 Hz

| kVA                     | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>2</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-------------------------|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| <b>Non-Encapsulated</b> |                                     |  |                |               |               |                              |                           |                        |              |                |
| .050                    | HS1B50                              | N/A  | 6.00 (152.4)   | 4.00 (101.6)  | 3.00 (76.2)   | 3.00 (1.36)                  | 2                         | 15                     | .208/.104    | 0.416/0.208    |
| .075                    | HS1B75                              |  | 6.00 (152.4)   | 4.00 (101.6)  | 3.00 (76.2)   | 3.00 (1.36)                  | 2                         | 15                     | .312/.156    | 0.625/0.312    |
| .100                    | HS1B100                             |  | 6.00 (152.4)   | 4.00 (101.6)  | 3.00 (76.2)   | 4.00 (1.81)                  | 2                         | 15                     | .417/.208    | 0.833/0.417    |
| .150                    | HS1B150                             |  | 8.00 (203.2)   | 4.00 (101.6)  | 4.00 (101.6)  | 5.00 (2.27)                  | 2                         | 15                     | .625/.313    | 1.25/.625      |
| .250                    | HS1B250                             |  | 8.00 (203.2)   | 4.00 (101.6)  | 4.00 (101.6)  | 8.00 (3.63)                  | 2                         | 15                     | 1.04/.512    | 2.08/1.04      |
| <b>Encapsulated</b>     |                                     |  |                |               |               |                              |                           |                        |              |                |
| 0.5                     | HS1F500B                            | HSP1F500B  | 10.00 (254.0)  | 6.00 (152.4)  | 5.00 (127.0)  | 22.0 (9.98)                  | 3                         | 15                     | 2.08/1.04    | 4.16/2.08      |
| 0.75                    | HS1F750B                            | HSP1F750B  | 10.00 (254.0)  | 6.00 (152.4)  | 5.00 (127.0)  | 27.0 (12.25)                 | 3                         | 15                     | 3.13/1.56    | 6.25/3.13      |
| 1                       | HS1F1BS                             | HSP1F1BS   | 10.00 (254.0)  | 6.00 (152.4)  | 5.00 (127.0)  | 28.0 (12.70)                 | 3                         | 16                     | 4.17/2.08    | 8.33/4.17      |
| 1.5                     | HS1F1.5AS                           | HSP1F1.5AS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 38.0 (17.24)                 | 4                         | 16                     | 6.25/3.13    | 12.5/6.25      |
| 2                       | HS1F2AS                             | HSP1F2AS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 45.0 (20.42)                 | 4                         | 16                     | 8.33/4.17    | 16.7/8.33      |
| 3                       | HS5F3AS                             | HSP5F3AS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 55.0 (24.95)                 | 4                         | 17                     | 12.5/6.25    | 25.0/12.5      |
| 5                       | HS5F5AS                             | HSP5F5AS   | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 131.0 (59.42)                | 4                         | 17                     | 20.8/10.4    | 41.6/20.8      |
| 7.5                     | HS5F7.5AS                           | HSP5F7.5AS   | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 155.0 (70.31)                | 4                         | 18                     | 31.3/15.6    | 62.5/31.3      |
| 10                      | HS5F10 AS                           | HSP5F10 AS   | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 166.0 (75.30)                | 4                         | 18                     | 41.7/20.8    | 83.3/41.7      |
| 15                      | HS5F15AS                            | HSP5F15AS  | 30.00 (762.0)  | 29.00 (736.6) | 12.00 (304.8) | 549.0 (249.02)               | 4                         | 18                     | 62.5/31.2    | 125.0/62.5     |
| 25                      | HS5F25 AS                           | HSP5F25 AS   | 30.00 (762.0)  | 29.00 (736.6) | 12.00 (304.8) | 637.0 (288.94)               | 4                         | 18                     | 104.0/52.0   | 208.0/104.0    |

### Group 2: 600 Volt Primary, 120/240 Secondary, 60 Hz

| kVA                     | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>2</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-------------------------|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| <b>Non-Encapsulated</b> |                                     |  |                |               |               |                              |                           |                        |              |                |
| .100                    | HS10B100                            | N/A  | 6.00 (152.4)   | 4.00 (101.6)  | 3.00 (76.2)   | 4.00 (1.81)                  | 2                         | 21                     | 0.167        | .833/.417      |
| .150                    | HS10B150                            |  | 8.00 (203.2)   | 4.00 (101.6)  | 4.00 (101.6)  | 5.00 (2.27)                  | 2                         | 21                     | 0.25         | 1.25/.625      |
| .250                    | HS10B250                            |  | 8.00 (203.2)   | 4.00 (101.6)  | 4.00 (101.6)  | 8.00 (3.63)                  | 2                         | 21                     | 0.417        | 2.08/1.04      |
| <b>Encapsulated</b>     |                                     |  |                |               |               |                              |                           |                        |              |                |
| .500                    | HS10F500B                           | HSP10F500B   | 10.00 (254.0)  | 6.00 (152.4)  | 5.00 (127.0)  | 22.0 (9.98)                  | 3                         | 21                     | 0.833        | 4.16/2.08      |
| .750                    | HS10F750B                           | HSP10F750B   | 10.00 (254.0)  | 6.00 (152.4)  | 5.00 (127.0)  | 23.0 (10.43)                 | 3                         | 21                     | 1.25         | 6.25/3.13      |
| 1                       | HS10F1BS                            | HSP10F1BS  | 10.00 (254.0)  | 6.00 (152.4)  | 5.00 (127.0)  | 28.0 (12.70)                 | 3                         | 21                     | 1.67         | 8.33/4.17      |
| 1.5                     | HS10F1.5AS                          | HSP10F1.5AS  | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 38.0 (17.24)                 | 4                         | 21                     | 2.5          | 12.5/6.25      |
| 2                       | HS10F2AS                            | HSP10F2AS  | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 60.0 (27.22)                 | 4                         | 21                     | 3.33         | 16.7/8.33      |
| 3                       | HS10F3AS                            | HSP10F3AS  | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 66.0 (29.94)                 | 4                         | 22                     | 5.0          | 25.0/12.5      |
| 5                       | HS10F5AS                            | HSP10F5AS  | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 100.0 (45.36)                | 4                         | 22                     | 8.3          | 41.6/20.8      |
| 7.5                     | HS10F7.5AS                          | HSP10F7.5AS  | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 135.0 (61.23)                | 4                         | 22                     | 12.5         | 62.5/31.3      |
| 10                      | HS10F10 AS                          | HSP10F10 AS  | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 150.0 (68.04)                | 4                         | 22                     | 16.7         | 83.3/41.7      |

Notes:

1. Design Styles and Electrical Connections can be found at the end of the Non-Ventilated Distribution Transformers section.
2. Contact Technical Services for other enclosure types.

## Selection Table: Single Phase

### Group 3: 120/208/240/277 Volt Primary, 120/240 Secondary, 60 Hz

| kVA                 | Catalog Number Group 1 Rolled Steel | Catalog Number Group 2 Stainless Steel <sup>3</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps @ 277 V | Secondary Amps |
|---------------------|-------------------------------------|---|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|----------------------|----------------|
| <b>Encapsulated</b> |                                     |   |                |               |               |                              |                           |                        |                      |                |
| 1                   | HS12F1BS                            | HSP12F1BS   | 10.00 (254.0)  | 6.00 (152.4)  | 5.00 (127.0)  | 29.0 (13.15)                 | 3                         | 19                     | 3.6                  | 8.33/4.17      |
| 1.5                 | HS12F1.5AS                          | HSP12F1.5AS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 40.0 (18.14)                 | 4                         | 20                     | 5.4                  | 12.5/6.25      |
| 2                   | HS12F2AS                            | HSP12F2AS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 60.0 (27.22)                 | 4                         | 20                     | 7.2                  | 16.7/8.33      |
| 3                   | HS12F3AS                            | HSP12F3AS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 66.0 (29.94)                 | 4                         | 20                     | 10.8                 | 25.0/12.5      |
| 5                   | HS12F5AS                            | HSP12F5AS   | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 104.0 (47.17)                | 4                         | 20                     | 18.0                 | 41.6/20.8      |
| 7.5                 | HS12F7.5AS                          | HSP12F7.5AS   | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 135.0 (61.23)                | 4                         | 20                     | 27.1                 | 62.5/31.3      |
| 10                  | HS12F10 AS                          | HSP12F10 AS   | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 156.0 (70.76)                | 4                         | 20                     | 36.1                 | 83.3/41.7      |

### Group 4: 190/200/208/220/380/400/415/440 Volt Primary, 110/220 Secondary, 50/60 Hz Copper wound 200/208/230/400/415/460 Volt Primary, 115/230 Secondary, 50/60 Hz Copper wound 208/240/415/480 Volt Primary, 120/240 Secondary, 60 Hz only Copper wound

| kVA                               | Catalog Number Group 1 Rolled Steel | Catalog Number Group 2 Stainless Steel <sup>3</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps <sup>2</sup> | Secondary Amps |
|-----------------------------------|-------------------------------------|---|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|---------------------------|----------------|
| <b>Encapsulated, Copper Wound</b> |                                     |   |                |               |               |                              |                           |                        |                           |                |
| 1                                 | HS14F1BS                            | HSP14F1BS   | 10.00 (254.0)  | 6.00 (152.4)  | 5.00 (127.0)  | 34.0 (15.42)                 | 3                         | 23                     | 4.5/2.3                   | 9.1/4.5        |
| 1.5                               | HS14F1.5BS                          | HSP14F1.5BS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 40.0 (18.13)                 | 4                         | 24                     | 6.8/3.4                   | 13.6/6.8       |
| 2                                 | HS14F2BS                            | HSP14F2BS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 60.0 (27.21)                 | 4                         | 24                     | 9.1/4.5                   | 18.2/9.1       |
| 3                                 | HS14F3BS                            | HSP14F3BS   | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 73.0 (33.11)                 | 4                         | 24                     | 13.6/6.8                  | 27.3/13.6      |
| 5                                 | HS14F5BS                            | HSP14F5BS   | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 100.0 (45.36)                | 4                         | 24                     | 22.7/11.4                 | 45.5/22.7      |
| 7.5                               | HS14F7.5BS                          | HSP14F7.5BS   | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 140.0 (63.50)                | 4                         | 24                     | 34.1/17.0                 | 68.2/34.1      |
| 10                                | HS14F10BS                           | HSP14F10BS  | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 175.0 (79.38)                | 4                         | 24                     | 45.5/22.7                 | 90.9/45.5      |

### Group 5: Export 190/200/208/220/380/400/415/440 Volt Primary, 110/220 Secondary, 50/60 Hz Copper wound Export 200/208/230/400/415/460 Volt Primary, 115/230 Secondary, 50/60 Hz Copper wound Export 208/240/415/480 Volt Primary, 120/240 Secondary, 60 Hz only Copper wound



| kVA                               | Catalog Number Group 1 Rolled Steel | Catalog Number Group 2 Stainless Steel <sup>3</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps <sup>2</sup> | Secondary Amps |
|-----------------------------------|-------------------------------------|---|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|---------------------------|----------------|
| <b>Encapsulated, Copper Wound</b> |                                     |   |                |               |               |                              |                           |                        |                           |                |
| 1                                 | HS14F1CS-CE                         | HSP14F1CS-CE  | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 52.0 (23.6)                  | 4                         | 24                     | 4.5/2.3                   | 9.1/4.5        |
| 1.5                               | HS14F1.5CS-CE                       | HSP14F1.5CS-CE                                      | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 55.0 (25.0)                  | 4                         | 24                     | 6.8/3.4                   | 13.6/6.8       |
| 2                                 | HS14F2CS-CE                         | HSP14F2CS-CE  | 12.00 (304.8)  | 10.00 (254.0) | 7.00 (177.8)  | 62.0 (28.1)                  | 4                         | 24                     | 9.1/4.5                   | 18.2/9.1       |
| 3                                 | HS14F3CS-CE                         | HSP14F3CS-CE  | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 142.0 (64.4)                 | 4                         | 24                     | 13.6/6.8                  | 27.3/13.6      |
| 5                                 | HS14F5CS-CE                         | HSP14F5CS-CE  | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 146.0 (66.2)                 | 4                         | 24                     | 22.7/11.4                 | 45.5/22.7      |
| 7.5                               | HS14F7.5CS-CE                       | HSP14F7.5CS-CE                                      | 17.00 (431.8)  | 14.00 (355.6) | 9.00 (228.6)  | 175.0 (79.4)                 | 4                         | 24                     | 34.1/17.0                 | 68.2/34.1      |

Notes:

1. Design Styles and Electrical Connections can be found at the end of the Non-Ventilated Distribution Transformers section.
2. Amperage calculated at 220/440 Volts on primary. UL Listed. 240 and 480 V not available at 50 Hz.
3. Contact Technical Services for other enclosure types.

## Selection Tables: Three Phase

### Group A: 480 Volt $\Delta$ Primary, 208Y/120 Secondary, 60 Hz

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>3</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT1F3AS                             | HTP1F3AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 105.0 (47.63)                | 4                         | 27                     | 3.6          | 8.3            |
| 6   | HT1F6AS                             | HTP1F6AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 27                     | 7.2          | 16.6           |
| 9   | HT1F9AS                             | HTP1F9AS   | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 250.0 (113.40)               | 4                         | 27                     | 10.8         | 25.0           |
| 15  | HT1F15AS                            | HTP1F15AS  | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 261.0 (118.39)               | 4                         | 27                     | 18.1         | 41.7           |
| 30  | HT1F30 AS                           | HTP1F30 AS   | 30.00 (762.0)  | 29.00 (736.6) | 12.00 (304.8) | 696.0 (315.70)               | 4                         | 27                     | 36.1         | 83.4           |
| 45  | HT1F45AS                            | HTP1F45AS  | 30.00 (762.0)  | 29.00 (736.6) | 12.00 (304.8) | 844.0 (382.83)               | 4                         | 27                     | 54.2         | 125.0          |

### Group B: 208 Volt $\Delta$ Primary, 208Y/120 Secondary, 60 Hz

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>3</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT3F3AS                             | HTP3F3AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 97.0 (44.00)                 | 4                         | 26                     | 7.2          | 8.3            |
| 6   | HT3F6AS                             | HTP3F6AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 26                     | 14.4         | 16.6           |
| 9   | HT3F9AS                             | HTP3F9AS   | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 256.0 (116.12)               | 4                         | 26                     | 21.7         | 25.0           |

### Group C: 480 Volt $\Delta$ Primary, 240 Volt $\Delta$ Secondary with 120 V reduced capacity center tap, 60 Hz <sup>2</sup>

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>3</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT5F3AS                             | HTP5F3AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 105.0 (47.63)                | 4                         | 28                     | 3.6          | 7.2            |
| 6   | HT5F6AS                             | HTP5F6AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 28                     | 7.2          | 14.4           |
| 9   | HT5F9AS                             | HTP5F9AS   | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 250.0 (113.40)               | 4                         | 28                     | 10.8         | 21.7           |
| 15  | HT5F15AS                            | HTP5F15AS  | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 305.0 (138.35)               | 4                         | 28                     | 18.1         | 36.1           |
| 30  | HT5F30 AS                           | HTP5F30 AS   | 30.00 (762.0)  | 29.00 (736.6) | 12.00 (304.8) | 698.0 (316.61)               | 4                         | 28                     | 36.1         | 72.2           |
| 45  | HT5F45AS                            | HTP5F45AS  | 30.00 (762.0)  | 29.00 (736.6) | 12.00 (304.8) | 876.0 (397.35)               | 4                         | 28                     | 54.2         | 108.3          |

### Group D: 240 Volt $\Delta$ Primary, 208Y/120 Secondary, 60 Hz

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>3</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT6F3AS                             | HTP6F3AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 97.0 (44.00)                 | 4                         | 25                     | 7.2          | 8.3            |
| 6   | HT6F6AS                             | HTP6F6AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 25                     | 14.4         | 16.6           |
| 9   | HT6F9AS                             | HTP6F9AS   | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 256.0 (116.12)               | 4                         | 25                     | 21.7         | 25.0           |

#### Notes:

1. Design Styles and Electrical Connections can be found at the end of the Non-Ventilated Distribution Transformers section.
2. Refer to *Capacity of Center Tap in Center Tap Delta Transformers* at the beginning of this section.
3. Contact Technical Services for other enclosure types.

## Selection Tables: Three Phase

### Group E: 480 Volt $\Delta$ Primary, 380Y/220 Secondary, 60 Hz

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>2</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT79F3AS                            | HTP79F3AS  | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 121.0 (54.88)                | 4                         | 29                     | 3.6          | 4.6            |
| 6   | HT79F6AS                            | HTP79F6AS  | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 29                     | 7.2          | 9.1            |
| 9   | HT79F9AS                            | HTP79F9AS  | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 255.0 (115.7)                | 4                         | 29                     | 10.8         | 13.6           |

### Group F: 600 Volt $\Delta$ Primary, 208Y/120 Secondary, 60 Hz

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>2</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT7F3AS                             | HTP7F3AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 116.0 (52.62)                | 4                         | 30                     | 2.9          | 8.3            |
| 6   | HT7F6AS                             | HTP7F6AS   | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 30                     | 5.8          | 16.6           |
| 9   | HT7F9AS                             | HTP7F9AS   | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 225.0 (115.67)               | 4                         | 30                     | 8.7          | 25.0           |

### Group G: 208 Volt $\Delta$ Primary, 480Y/277 Secondary, 60 Hz

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>2</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT84F3AS                            | HTP84F3AS  | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 97.0 (44.00)                 | 4                         | 31                     | 8.3          | 3.6            |
| 6   | HT84F6AS                            | HTP84F6AS  | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 31                     | 16.6         | 7.2            |
| 9   | HT84F9AS                            | HTP84F9AS  | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 256.0 (116.12)               | 4                         | 31                     | 25.0         | 10.8           |

### Group H: 240 Volt $\Delta$ Primary, 480Y/277 Secondary, 60 Hz

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>2</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT85F3AS                            | HTP85F3AS  | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 97.0 (44.00)                 | 4                         | 32                     | 7.2          | 3.6            |
| 6   | HT85F6AS                            | HTP85F6AS  | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 32                     | 14.4         | 7.2            |
| 9   | HT85F9AS                            | HTP85F9AS  | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 256.0 (116.12)               | 4                         | 32                     | 21.6         | 10.8           |

### Group J: 480 Volt $\Delta$ Primary, 480Y/277 Secondary, 60 Hz

| kVA | Catalog Number Group I Rolled Steel | Catalog Number Group II Stainless Steel <sup>2</sup> | Height in (mm) | Width in (mm) | Depth in (mm) | Approx. Ship Weight lbs (kg) | Design Style <sup>1</sup> | Elec Conn <sup>1</sup> | Primary Amps | Secondary Amps |
|-----|-------------------------------------|--|----------------|---------------|---------------|------------------------------|---------------------------|------------------------|--------------|----------------|
| 3   | HT81F3AS                            | HTP81F3AS  | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 121.0 (54.88)                | 4                         | 29                     | 3.6          | 3.6            |
| 6   | HT81F6AS                            | HTP81F6AS  | 13.00 (330.2)  | 16.00 (406.4) | 9.00 (228.6)  | 150.0 (68.03)                | 4                         | 29                     | 7.2          | 7.2            |
| 9   | HT81F9AS                            | HTP81F9AS  | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 255.0 (115.7)                | 4                         | 29                     | 10.8         | 10.8           |
| 15  | HT81F15AS                           | HTP81F15AS   | 17.00 (431.8)  | 20.00 (508.0) | 11.00 (279.4) | 261.0 (118.39)               | 4                         | 29                     | 18.1         | 18.1           |
| 30  | HT81F30 AS                          | HTP81F30 AS  | 30.00 (762.0)  | 29.00 (736.6) | 12.00 (304.8) | 696.0 (315.70)               | 4                         | 29                     | 36.1         | 36.1           |
| 45  | HT81F45AS                           | HTP81F45AS   | 30.00 (762.0)  | 29.00 (736.6) | 12.00 (304.8) | 844.0 (382.83)               | 4                         | 29                     | 54.2         | 54.2           |

#### Notes:

1. Design Styles and Electrical Connections can be found at the end of the Non-Ventilated Distribution Transformers section.
2. Contact Technical Services for other enclosure types.

Design Styles



Style 2 - Non-Encapsulated



Style 3 - Encapsulated



Style 4 - Encapsulated

Customized Enclosures - Contact Technical Services



Style 5 - Encapsulated

Available for all encapsulated kVA sizes (For Type 4, 12 and 4X)

## Electrical Connections (Single Phase)

240 X 480 Volt Primary  
120/240 Volt Secondary  
Taps: None

**15**

| Primary Voltage   | Interconnect              | Connect Lines to |
|-------------------|---------------------------|------------------|
| 480               | H2 to H3                  | H1 & H4          |
| 240               | H1 to H3<br>H2 to H4      | H1 & H4          |
| Secondary Voltage | Interconnect              | Connect Lines to |
| 240               | X2 to X3                  | X1 & X4          |
| 120-0-120         | X2 to X3<br>X2 to $\perp$ | X1-X2-X4         |
| 120               | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS1 Series**

240 X 480 Volt Primary  
120/240 Volt Secondary  
Taps: None

**16**

| Primary Voltage   | Interconnect              | Connect Lines to |
|-------------------|---------------------------|------------------|
| 480               | H2 to H3                  | H1 & H4          |
| 240               | H1 to H3<br>H2 to H4      | H1 & H4          |
| Secondary Voltage | Interconnect              | Connect Lines to |
| 240               | X2 to X3                  | X1 & X4          |
| 120-0-120         | X2 to X3<br>X2 to $\perp$ | X1-X2-X4         |
| 120               | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS1 Series**

240 X 480 Volt Primary  
120/240 Volt Secondary  
Taps: 2, 2½% FCAN & FCBN

**17**

| Primary Voltage   | Interconnect              | Connect Lines to |
|-------------------|---------------------------|------------------|
| 504               | H4 to H5                  | H1 & H8          |
| 492               | H3 to H5                  | H1 & H8          |
| 480               | H3 to H6                  | H1 & H8          |
| 468               | H2 to H6                  | H1 & H8          |
| 456               | H2 to H7                  | H1 & H8          |
| 252               | H1 to H5<br>H4 to H8      | H1 & H8          |
| 240               | H1 to H6<br>H3 to H8      | H1 & H8          |
| 228               | H1 to H7<br>H2 to H8      | H1 & H8          |
| Secondary Voltage | Interconnect              | Connect Lines to |
| 240               | X2 to X3                  | X1 & X4          |
| 120-0-120         | X2 to X3<br>X2 to $\perp$ | X1-X2-X4         |
| 120               | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS5 Series**

240 X 480 Volt Primary,  
120/240 Volt Secondary  
Taps: 2, 2½% FCAN; 4, 2½% FCBN

**18**

| Primary Voltage   | Interconnect              | Connect Lines to |
|-------------------|---------------------------|------------------|
| 504               | H5 to H6                  | H1 & H10         |
| 492               | H4 to H6                  | H1 & H10         |
| 480               | H4 to H7                  | H1 & H10         |
| 468               | H3 to H7                  | H1 & H10         |
| 456               | H3 to H8                  | H1 & H10         |
| 444               | H2 to H8                  | H1 & H10         |
| 432               | H2 to H9                  | H1 & H10         |
| 252               | H1 to H6<br>H5 to H10     | H1 & H10         |
| 240               | H1 to H7<br>H4 to H10     | H1 & H10         |
| 228               | H1 to H8<br>H3 to H10     | H1 & H10         |
| 216               | H1 to H9<br>H2 to H10     | H1 & H10         |
| Secondary Voltage | Interconnect              | Connect Lines to |
| 240               | X2 to X3                  | X1 & X4          |
| 120-0-120         | X2 to X3<br>X2 to $\perp$ | X1-X2-X4         |
| 120               | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS5 Series**

120/208/240/277 Volt Primary  
120/240 Volt Secondary  
Taps: None

**19**

| Primary Voltage   | Interconnect              | Connect Lines to |
|-------------------|---------------------------|------------------|
| 277               | H2 to H3                  | H1 & H6          |
| 240               | H2 to H3                  | H1 & H5          |
| 208               | H2 to H3                  | H1 & H4          |
| 120               | H1 to H3<br>H2 to H5      | H1 & H5          |
| Secondary Voltage | Interconnect              | Connect Lines to |
| 240               | X2 to X3                  | X1 & X4          |
| 120-0-120         | X2 to X3<br>X2 to $\perp$ | X1-X2-X4         |
| 120               | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS12 Series (1 kVA only)**

$\perp$  = Earth Ground

Note:

Connect the electrostatic shield to the equipment ground (green) or to both the equipment ground and the system ground (white). Specifications are subject to change without notice.

120/208/240/277 Volt Primary  
120/240 Volt Secondary  
Taps: None

**20**

| Primary Voltage   | Interconnect              | Connect Lines to |
|-------------------|---------------------------|------------------|
| 277               | H4 to H5                  | H1 & H8          |
| 240               | H3 to H6                  | H1 & H8          |
| 208               | H2 to H7                  | H1 & H8          |
| 120               | H1 to H6<br>H3 to H8      | H1 & H8          |
| Secondary Voltage | Interconnect              | Connect Lines to |
| 240               | X2 to X3                  | X1 & X4          |
| 120-0-120         | X2 to X3<br>X2 to $\perp$ | X1-X2-X4         |
| 120               | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS12 Series**

## Electrical Connections (Single Phase)

600 Volt Primary,  
120/240 Volt Secondary  
Taps: None

### 21

| Primary Voltage   | Interconnect              | Connect Lines to |
|-------------------|---------------------------|------------------|
| 600               |                           | H1 & H2          |
| Secondary Voltage | Interconnect              | Connect Lines to |
| 240               | X2 to X3                  | X1 & X4          |
| 120-0-120         | X2 to X3<br>X2 to $\perp$ | X1, X2 & X4      |
| 120               | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS10 Series**

Note: 1 through 2 kVA units have electrostatic shielding.

190/200/208/220/380/400/415/440 Volt Pri.  
110/220 Volt Secondary  
Taps: None

### 24

| Primary Voltage             | Interconnect              | Connect Lines to |
|-----------------------------|---------------------------|------------------|
| 440/460/480                 | H5 to H6                  | H1 & H10         |
| 415                         | H4 to H7                  | H1 & H10         |
| 400/415                     | H3 to H8                  | H1 & H10         |
| 380/400                     | H2 to H9                  | H1 & H10         |
| 220/230/240                 | H1 to H6,<br>H5 to H10    | H1 & H10         |
| 208                         | H1 to H7,<br>H4 to H10    | H1 & H10         |
| 200/208                     | H1 to H8,<br>H3 to H10    | H1 & H10         |
| 190/200/208                 | H1 to H9<br>H2 to H10     | H1 & H10         |
| Secondary Voltage           | Interconnect              | Connect Lines to |
| 220/230/240                 | X2 to X3                  | X1 & X4          |
| 110,220/115,<br>230/120,240 | X2 to X3<br>X2 to $\perp$ | X1, X2 & X4      |
| 110/115/120                 | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS14 Series**

600 Volt Primary  
120/240 Volt Secondary  
Taps: 2, 5% FCBN

### 22

| Primary Voltage   | Interconnect              | Connect Lines to |
|-------------------|---------------------------|------------------|
| 600               | H3 to H4                  | H1 & H6          |
| 570               | H2 to H4                  | H1 & H6          |
| 540               | H2 to H5                  | H1 & H6          |
| Secondary Voltage | Interconnect              | Connect Lines to |
| 240               | X2 to X3                  | X1 & X4          |
| 120-0-120         | X2 to X3<br>X2 to $\perp$ | X1-X2-X4         |
| 120               | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS10 Series**

190/200/208/220/380/400/415/440 Volt Pri.  
110/220 Volt Secondary  
Taps: None

### 23

| Primary Voltage             | Interconnect              | Connect Lines to |
|-----------------------------|---------------------------|------------------|
| 440/460/480                 | H5 to H6                  | H1 & H10         |
| 415                         | H4 to H6                  | H1 & H9          |
| 400/415                     | H3 to H6                  | H1 & H8          |
| 380/400                     | H2 to H6                  | H1 & H7          |
| 220/230/240                 | H1 to H6<br>H5 to H10     | H1 & H10         |
| 208                         | H1 to H6<br>H4 to H9      | H1 & H9          |
| 200/208                     | H1 to H6<br>H3 to H8      | H1 & H8          |
| 190/200/208                 | H1 to H6<br>H2 to H7      | H1 & H7          |
| Secondary Voltage           | Interconnect              | Connect Lines to |
| 220/230/240                 | X2 to X3                  | X1 & X4          |
| 110,220/115,<br>230/120,240 | X2 to X3<br>X2 to $\perp$ | X1, X2 & X4      |
| 110/115/120                 | X1 to X3<br>X2 to X4      | X1 & X4          |

**HS14F1BS**

$\perp$  = Earth Ground

Note:

Connect the electrostatic shield to the equipment ground (green) or to both the equipment ground and the system ground (white). Specifications are subject to change without notice.



Electrical Connections (Three Phase)

240 Δ Volt Primary  
208Y/120 Volt Secondary  
Taps: 2, 5% FCBN

## 25

| Primary Voltage   | Connect Taps       | Connect Lines To |
|-------------------|--------------------|------------------|
| 240               | 1-H1 & 2-H2 & 3-H3 | H1, H2, H3       |
| 228               | 4-H1 & 5-H2 & 6-H3 | H1, H2, H3       |
| 216               | 7-H1 & 8-H2 & 9-H3 | H1, H2, H3       |
| Secondary Voltage |                    | Connect Lines To |
| 208               |                    | X1, X2, & X3     |
| 120               |                    | X0, X1, X2, X3   |

**HT6 Series**

208 Δ Volt Primary  
208Y/120 Volt Secondary  
Taps: 2, 5% FCBN

## 26

| Primary Voltage   | Connect Taps       | Connect Lines To |
|-------------------|--------------------|------------------|
| 208               | 1-H1 & 2-H2 & 3-H3 | H1, H2, H3       |
| 198               | 4-H1 & 5-H2 & 6-H3 | H1, H2, H3       |
| 187               | 7-H1 & 8-H2 & 9-H3 | H1, H2, H3       |
| Secondary Voltage |                    | Connect Lines To |
| 208               |                    | X1, X2, & X3     |
| 120               |                    | X0, X1, X2, X3   |

**HT3 Series**

480 Δ Volt Primary  
208Y/120 Volt Secondary  
Taps: 2, 5% FCBN

## 27

| Primary Voltage   | Interconnect       | Connect Lines to |
|-------------------|--------------------|------------------|
| 480               | 1-H1 & 2-H2 & 3-H3 | H1, H2, H3       |
| 456               | 4-H1 & 5-H2 & 6-H3 | H1, H2, H3       |
| 432               | 7-H1 & 8-H2 & 9-H3 | H1, H2, H3       |
| Secondary Voltage |                    | Connect Lines to |
| 208               |                    | X1, X2, & X3     |
| 120               |                    | X0, X1, X2, X3   |

**HT1 Series**

480 Δ Volt Primary  
240 Δ w/120 CT Volt Secondary  
Taps: 2, 5% FCBN

## 28

| Primary Voltage   | Connect Taps       | Connect Lines To |
|-------------------|--------------------|------------------|
| 480               | 1-H1 & 2-H2 & 3-H3 | H1, H2, H3       |
| 456               | 4-H1 & 5-H2 & 6-H3 | H1, H2, H3       |
| 432               | 7-H1 & 8-H2 & 9-H3 | H1, H2, H3       |
| Secondary Voltage | Interconnect       | Connect Lines To |
| 240               |                    | X1, X2, X3       |
| 120-0-120         | X6 to              | X1-X6-X3         |

**HT5 Series**

480 Δ Volt Primary  
380Y/220 Volt Secondary  
Taps: 2, 5% FCBN

## 29

| Primary Voltage   | Interconnect       | Connect Lines to |
|-------------------|--------------------|------------------|
| 480               | 1-H1 & 2-H2 & 3-H3 | H1, H2 & H3      |
| 456               | 4-H1 & 5-H2 & 6-H3 | H1, H2 & H3      |
| 432               | 7-H1 & 8-H2 & 9-H3 | H1, H2 & H3      |
| Secondary Voltage | Interconnect       | Connect Lines to |
| 380               |                    | X1, X2, X3       |
| 220               |                    | X0, X1, X2, X3   |

**HT79 Series**

= Earth Ground

Notes:

Connect the electrostatic shield to the equipment ground (green) or to both the equipment ground and the system ground (white). Specifications are subject to change without notice.

## Electrical Connections (Three Phase)

**30**  
600 Δ Volt Primary  
208Y/120 Volt Secondary  
Taps: 2, 5% FCBN

| Primary Voltage   | Connect Taps       | Line Leads     |
|-------------------|--------------------|----------------|
| 600               | 1-H1 & 2-H2 & 3-H3 | H1, H2, H3     |
| 570               | 4-H1 & 5-H2 & 6-H3 | H1, H2, H3     |
| 540               | 7-H1 & 8-H2 & 9-H3 | H1, H2, H3     |
| Secondary Voltage |                    | Line Leads     |
| 208               |                    | X1, X2, X3     |
| 120               |                    | X0, X1, X2, X3 |

**HT7 Series**

**31**  
208 Δ Volt Primary  
480Y/277 Volt Secondary  
Taps: 2, 5% FCBN

| Primary Voltage   | Connect Taps       | Line Leads     |
|-------------------|--------------------|----------------|
| 208               | 1-X1 & 2-X2 & 3-X3 | X1, X2, X3     |
| 198               | 4-X1 & 5-X2 & 6-X3 | X1, X2, X3     |
| 187               | 7-X1 & 8-X2 & 9-X3 | X1, X2, X3     |
| Secondary Voltage |                    | Line Leads     |
| 480               |                    | H1, H2, H3     |
| 277               |                    | H0, H1, H2, H3 |

**HT84 Series**

**32**  
240 Δ Volt Primary  
480Y/277 Volt Secondary  
Taps: 2, 5% FCBN

| Primary Voltage   | Connect Taps       | Line Leads     |
|-------------------|--------------------|----------------|
| 240               | 1-X1 & 2-X2 & 3-X3 | X1, X2, X3     |
| 228               | 4-X1 & 5-X2 & 6-X3 | X1, X2, X3     |
| 216               | 7-X1 & 8-X2 & 9-X3 | X1, X2, X3     |
| Secondary Voltage |                    | Line Leads     |
| 480               |                    | H1, H2, H3     |
| 277               |                    | H0, H1, H2, H3 |

**HT85 Series**

**33**  
480 Δ Volt Primary  
480Y/277 Volt Secondary  
Taps: 2, 5% FCBN

| Primary Voltage   | Interconnect       | Connect Lines to |
|-------------------|--------------------|------------------|
| 480               | 1-H1 & 2-H2 & 3-H3 | H1, H2 & H3      |
| 456               | 4-H1 & 5-H2 & 6-H3 | H1, H2 & H3      |
| 432               | 7-H1 & 8-H2 & 9-H3 | H1, H2 & H3      |
| Secondary Voltage | Interconnect       | Connect Lines to |
| 480               |                    | X1, X2, X3       |
| 277               |                    | X0, X1, X2, X3   |

**HT81 Series**

**Notes:**

Connect the electrostatic shield to the equipment ground (green) or to both the equipment ground and the system ground (white). Specifications are subject to change without notice.

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

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Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

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