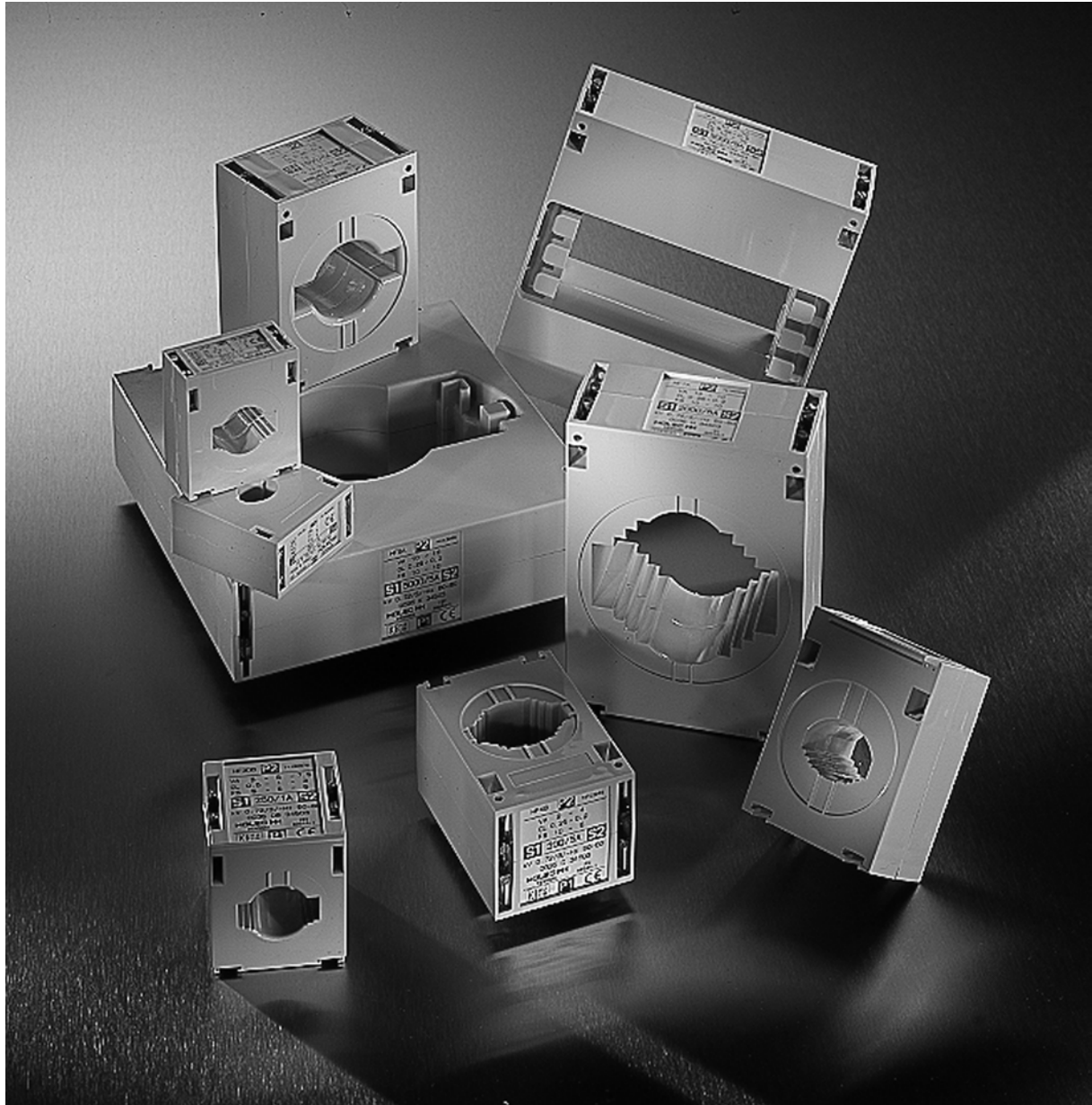


Type HF



**Primary current up to 5000 Amps.
Accuracy classes from 0.2S to 3
Highest system voltage 720 volt**

Table of Contents

	Page
General terms of sale and delivery	2
Description – Current transformers type HF	4
Measuring accuracy	5
Survey chart – Accuracy class 0,5 – 1 – 3, type HF3A, HF3B and HF3DB	6
Survey chart – Accuracy class 0,5 – 1 – 3, type HF4C, HF4B and HF5	7
Survey chart – Accuracy class 0,5 – 1 – 3, type HF7A, HF6 and HF8A	8
Survey chart – Accuracy class 0,2S – 0,2, type HF4B, HF5, HF6, HF7A and HF8A	9
Survey chart – Saturation transformers type HF2A2 and HF2B2	10
Primary winding, at lower primary current	11
Mountings	12
Accessories	13-14
Dimensions, type HF3A, HF2A2, HF3B, HF2B2 and HF3DB	15
Dimensions, type HF4C and HF4B	16
Dimensions, type HF5 and HF7A	17
Dimensions, type HF6 and HF8A	18
Price list – Valid from 1 st January 2004	19-22

General Description

A current transformer is a central part of a measuring system. There are many reasons why the Eaton Holec through-primary current transformer type HF is something special. One reason is that it is **easily mounted** - the same transformer can be used for bars as well as for round conductors. Most of the transformers cover, within the **same order number**, the **accuracy classes 0.5, 1 and 3** in one standard series and the **accuracy classes 0.2S and 0.2** in the other standard series. Consequently, a minimal number of transformers can cover a wide range of applications thereby reducing the total expenses for investment and storage. **Small external dimensions** make the HF-series especially attractive for use in modern compact equipment with small phase distances.

The very large aperture can be used for primary winding too. When very small bars and large apertures (HF4B, HF5, and HF7A) are involved, the transformer is mounted on bar by means of an insert. The transformers of the HF-series have qualities that make them suitable for use under difficult operating conditions too.

Secondary Terminals

The secondary terminals are corrosion-resistant (copper rich alloy and nickel-plated) and vibration-proof (Reakdyn system). **Mounting of secondary conductors** used to be errorprone and costly. Now the conductor can be **mounted directly** for a modest sum of money (without any further preparations like mounting of cable lug, soldering etc.). The terminals accommodate solid as well as multicore conductors. The secondary terminals have a double connection which permits the shorting of the secondary winding during operation, e.g. when replacing the measuring equipment connected. These reliable terminals are located within the transformer enclosure to avoid unintentional touching or short-circuiting of the terminals.

Enclosure

The enclosure is moulded in a thermoplastic material (Polycarbonat Lexan® 940) which is heat and impact resistant and **selfextinguishing** (V-0 according to UL 94). As it has **excellent tracking resistance and insulating properties**, it permits the mounting of the HF transformers even if there is very little space. The transformer withstands at rated current continuously an ambient temperature up to 55° C at a temperature of 90° C on the primary conductor simultaneously. Insulation class B (IEC 85).

Rating Plate

Another point worth noticing is the **data label giving all necessary information**. The label is mounted on the front of the transformer, therefore you can easily identify the transformer after mounting. The data label is placed behind a transparent pane, so the data information cannot be scratched off, washed off or da-maged in other ways. The data label and the pane are built into the transformer which prevent them from falling off.

Accessories


The accessories are a very important part of the quality features of a transformer. Eaton Holec therefore uses only carefully constructed high quality equipment which lives up to your expectation for **high reliability at reasonable costs**. The main features are: **easy mounting without tools, vibration-proof and corrosion-resistant**.

Thus the clamps for bar mounting are made of resilient stainless steel. They are therefore able to compensate for the thermal expansions and contractions of the bar and the enclosure, thus securing a stable and vibration-proof fixing. Top hat rail bar fittings and fittings for mounting on base plate are also made of resilient stainless steel.

Special Application

Due to excellent performance, the HF-range is widely being used on board ships approved by the classification societies.

General Technical Specifications

Standard:	IEC-publication 60044-1 Cenelec HD 553 S2
Highest rated voltage:	0.72 kV
Test voltage one minute:	3 kV
Frequency:	50-60 cycles
Rated secondary current:	5A or 1A
Self-extinguishing enclosure:	UL 94 class V-0
Product approval:	

Product Survey

Measuring accuracy, see page 5.

Current transformers class 0.5 - 1 and 3, see page 6-8.

The survey comprises Eaton Holec's standard range of transformers usually used in connection with instruments and meters with an accuracy range of 1-5%.

Current transformers class 0.2S and 0.2, see page 9.

This survey comprises the standard range of transformers where special precision is needed, mechanical/electronic kWh meters with high precision.

Saturation transformers, see page 10.

If you work with the problem of protection of motors designed to start heavy swing loads, Eaton Holec offers a very reliable and competitive range.

Primary winding, see page 11.

If you need current transformers at lower primary currents and bigger output, the solution is a standard current transformer provided with a primary winding.

Accessories for transformers, see page 12-14.

Dimensions of the transformers, see page 15-18.

Special Transformers

Eaton Holec will readily produce customer specified cable low voltage current transformers with bigger through-primary hole in accuracy classes from 0.2S.

Furthermore, it is possible to deliver split-core current transformers.

Special leaflet is available.

Measuring Accuracy

Accuracy- classes acc. to IEC 60044-1	Percentage current error +/- % % Rated current (I_{pn})						Phase displacement +/- minutes % Rated current (I_{pn})				
	1	5	20	50	100	120	1	5	20	100	120
0,2S	0,75	0,35	0,2		0,2	0,2	30	15	10	10	10
0,2		0,75	0,35		0,2	0,2		30	15	10	10
0,5		1,5	0,75		0,5	0,5		90	45	30	30
1		3	1,5		1	1		180	90	60	60
3				3		3					

The table above show the accuracy classes corresponding to the HF-serie.

The accuracy classes must be respected at rated burden according to IEC 60044-1 (VA mentioned at the rating plate of the transformer) as well as at 25% of the rated burden, however not less than 1 VA.

It is valid for all transformers from Eaton Holec that the respective accuracy class is respected from 1 VA till rated burden irrespective of that the 25% of the rated burden could allow a value greater than 1 VA.

The measuring accuracy of a current transformer depend on the total burden in the secondary circuit.

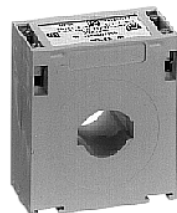
To obtain the measuring accuracy of a given class, the total burden must therefore stay within the output of the current transformer in the required class.

The total burden of the transformer is made up of the burden from the connected instrument and wires.
The tables below may be used as a guide on typical burdens.

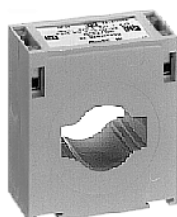
Burden	VA	Rated secondary- current	Size of- conductor	Double wire, meters*				
				0,5	1,0	2,5	5	10
				Copper wire VA-burden				
Moving iron instrument	0,3-1,2	5A	1,5 mm ²	0,29	0,58	1,45	2,9	5,8
Moving coil instrument	0,3-1,2		2,5 mm ²	0,18	0,35	0,88	1,75	3,5
Bimetal instrument	2,0-3,2	1A	1 mm ²	0,018	0,035	0,09	0,18	0,35
KWh-meter/current circuit	0,3-4		1,5 mm ²	0,012	0,023	0,06	0,12	0,23
			2,5 mm ²	0,007	0,014	0,035	0,07	0,14

* Double wire meters: From transformer to instrument and return to transformer.

Survey Chart – Accuracy Class 0,5 – 1 – 3



HF3A



HF3B



HF3DB

Rated primary current A	Rated secondary current A	HF3A				HF3B				HF3DB			
		VA output in Class			No.	VA output in Class			No.	VA output in Class			No.
		0,5	1	3		0,5	1	3		0,5	1	3	
30	5 1	-	-	-	- 741B0008								
50	5 1	-	1	2	741B0011 741B0031					-	-	2	741B0059 741B0069
60	5 1	-	1	2,5	741B0013 741B0021					-	1	2,5	741B0060 741B0070
75	5 1	-	1,5	3	741B0012 741B0032					-	1,5	3	741B0061 741B0071
80	5 1	-	2	3	741B0087 741B0088					-	2	3	741B0062 741B0072
100	5 1	1,5	3	5	741B0014 741B0033	-	-	2	741B0004 741B0006	-	3	5	741B0063 741B0073
125	5 1	2,5	3	5	741B0025 741B0089	1	2	2,5	741B0097 741B0023	2	3	5	741B0065 741B0075
150	5 1	2,5	5	5	741B0016 741B0034	1	2,5	3	741B0005 741B0007	2,5	5	5	741B0066 741B0076
200	5 1	2,5	5	7,5	741B0017 741B0035	1	2,5	3	741B0018 741B0036	2,5	5	7,5	741B0067 741B0077
250	5 1	5	5	7,5	741B0027 741B0028	2,5	2,5	4	741B0019 741B0029	5	5	7,5	741B0068 741B0078
300	5 1					2,5	5	5	741B0020 741B0037				
400	5 1					2,5	5	5	741B0022 741B0038				
500	5 1					2,5	5	5	741B0024 741B0039				
600	5 1					5	5	7,5	741B0026 741B0040				

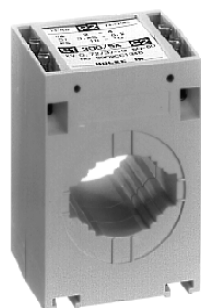
Max. dimension of primary bar, mm	5 x 20	10 x 30	10 x 30
Conductor mm (diameter)	17	23	23
Secondary terminals	max. 2,5 mm ²	max. 2,5 mm ²	max. 2,5 mm ²
Ith kArms for 1 sec.	15	45	45
Clamp (for bar mounting)	741B0030		741B0233
Sealable cover	741B0232		
Fittings for base plate	741B0230		
Fittings for top hat rail	741B0231		741B0243
Bush	741B0321	741B0322	

Special primary or secondary current can be made on request.

Survey Chart – Accuracy Class 0,5 – 1 – 3



HF4C



HF4B



HF5

Rated primary current A	Rated secondary current A	HF4C				HF4B				HF5			
		VA output in Class			No.	VA output in Class			No.	VA output in Class			No.
		0,5	1	3		0,5	1	3		0,5	1	3	
50	5 1	-	1,5	3	741C2024 741C2004	-	-	2	741C2057 741C2054				
60	5 1	-	2,5	4	741C2025 741C2005	-	-	2	741C2058 741C2055				
75	5 1	1,5	3	5	741C2026 741C2006	-	1	2,5	741C2059 741C2056				
80	5 1	2	3	5	741C2027 741C2007								
100	5 1	2,5	4	7,5	741C2028 741C2008	1	2,5	5	741C2060 741C2068				
125	5 1	4	5	10	741C2030 741C2010								
150	5 1	5	10	15	741C2031 741C2011	2,5	5	5	741C2061 741C2069				
200	5 1	10	15	20	741C2032 741C2012	5	5	7,5	741C2062 741C2070				
250	5 1	10	15	20	741C2033 741C2013	5	7,5	10	741C2063 741C2071				
300	5 1					7,5	10	15	741C2064 741C2072	5	7,5	10	741E0011 -
400	5 1					7,5	10	15	741C2065 741C2073	10	10	15	741E0021 741E0028
500	5 1					10	10	15	741C2066 741C2074	15	20	20	741E0022 741E0029
600	5 1					10	15	20	741C2067 741C2075	15	20	20	741E0023 741E0030
750	5 1									15	20	20	741E0034 741E0035
800	5 1									20	20	20	741E0024 741E0031
1000	5 1									30	30	30	741E0025 741E0032
1200	5 1									30	30	30	741E0026 741E0033
1250	5 1									30	30	30	741E0037 741E0038
1500	5 1									30 20	30 20	30 30	741E0027 741E0017
1600	5 1									30 20	30 20	30 30	741E0039 741E0018

Max. dimension of primary bar, mm	10 x 20 6 x 30	10 x 40	12 x 60
Conductor mm (diameter)	23	28	39
Secondary terminals	max. 6 mm ²	max. 6 mm ²	max. 6 mm ²
Ith kArms for 1 sec.	30	60	100
Clamp* (for bar mounting)		741C0256	
Sealable covers		741C0221	
Insert			741C0329
Fittings for base plate		741H0230	
Fittings for top hat rail		741C0243	

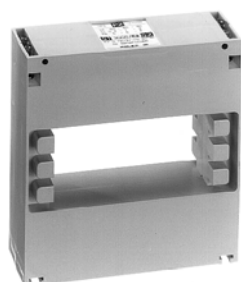
* Accessories included with the transformer (numbers only for spare part ordering).

Special primary or secondary current can be made on request.

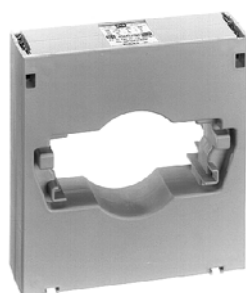
Survey Chart – Accuracy Class 0,5 – 1 – 3



HF7A



HF6



HF8A

Rated primary current A	Rated secondary current A	HF7A				HF6				HF8A			
		VA output in Class			No.	VA output in Class			No.	VA output in Class			No.
		0,5	1	3		0,5	1	3		0,5	1	3	
200	5 1												
250	5 1												
300	5 1												
400	5 1	5	7,5	10	741H0011 741H0024								
500	5 1	7,5	10	15	741H0012 741H0025								
600	5 1	7,5	10	15	741H0013 741H0026								
750	5 1	10	15	20	741H0014 741H0027								
800	5 1	10	15	20	741H0015 741H0028								
1000	5 1	15	20	30	741H0016 741H0029	20	30	30	741F0023 741F0033				
1200	5 1	15	20	30	741H0017 741H0030	20	30	30	741F0024 -				
1250	5 1	15	20	30	741H0018 741H0031	20	30	30	741F0022 -				
1500	5 1	20	30	45	741H0019 741H0032	30	45	45	741F0025 741F0035	15	30	45	741K0011 741K0019
1600	5 1	20	30	45	741H0020 741H0033	30	45	45	741F0026 -				
2000	5 1	30	45	45	741H0021 741H0034	30	45	60	741F0027 741F0037	15	30	45	741K0013 741K0021
2500	5 1	30	45	45	741H0023 741H0036	30	45	60	741F0028 741F0038	15	30	45	741K0014 741K0022
3000	5 1					30	45	60	741F0029 741F0039	30	45	60	741K0016 741K0024
4000	5 1									30	45	60	741K0017 741K0025
5000	5 1									30	45	60	741K0018 -

Max. dimension of primary bar, mm	2 // 10 x 80 3 // 10 x 50	3 // 10 x 100	2 // 10 x 120 3 // 10 x 100
Conductor mm (diameter)	65	2 // 55	81
Secondary terminal	max. 6 mm ²	max. 6 mm ²	max. 6 mm ²
Ith kArms for 1 sec.	120	>120	>120
Clamp* (for bar mounting)	741C0256	741F0220	
Sealable covers		741C0221	
Insert*	741H0240		
Fittings for base plate		741H0230	
Fittings for top hat rail		741C0243	

* Accessories included with the transformer (numbers only for spare part ordering).

Special primary or secondary current can be made on request.

Survey Chart – Accuracy Class 0,2S and 0,2

Rated primary current A	Rated secondary current A	HF4B			HF5			HF7A			HF6			HF8A		
		VA in Class		No.	VA in Class		No.	VA in Class		No.	VA in Class		No.	VA in Class		No.
		0,2S	0,2		0,2S	0,2		0,2S	0,2		0,2S	0,2		0,2S	0,2	
100	5	1,25	-	741C2078												
150	5	1,25	-	741C2079												
200	5	1,5	-	741C2080												
200	5	-	2	741C2082												
250	5	2	-	741C2081												
250	5	-	2,5	741C2084												
300	5	2	4	741C2086	1,5	2,5	741E0060									
400	5	2,5	4	741C2088	2	4	741E0040									
500	5	5	7,5	741C2090	2,5	5	741E0042									
600	5	5	7,5	741C2092	5	7,5	741E0044									
750	5				5	7,5	741E0046	5	7,5	741H0050						
800	5				5	7,5	741E0048	5	7,5	741H0052						
1000	5				7,5	10	741E0050	7,5	10	741H0054	5	10	741F0050			
1200	5				10	10	741E0052	10	10	741H0056	7,5	10	741F0052			
1250	5				10	10	741E0054	10	10	741H0058	7,5	10	741F0054			
1500	5				10	10	741E0056	10	10	741H0060	10	10	741F0056	7,5	10	741K0031
1600	5				10	10	741E0058	10	10	741H0062	10	10	741F0058	-	-	-
2000	5							10	10	741H0064	10	10	741F0060	10	10	741K0033
2400	5							10	10	741H0066	10	10	741F0062	-	-	-
2500	5							10	10	741H0068	10	10	741F0064	10	10	741K0034
3000	5										10	10	741F0066	10	10	741K0036
4000	5													10	10	741K0037
5000	5													10	10	741K0038

Max. dimension of primary bar, mm	10 x 40	12 x 60	2 // 10 x 80 3 // 10 x 50	3 // 10 x 100	2 // 10 x 120 3 // 10 x 100
Conductor mm (diameter)	28	39	65	2 // 55	81
Secondary terminals	max. 6 mm ²	max. 6 mm ²	max. 6 mm ²	max. 6 mm ²	max. 6 mm ²
lth kArms for 1 sec.	60	100	120	>120	>120
Clamp (f. bar mounting)*	741C0256			741F0220	
Sealable covers	741C0221				
Insert	741C0329		741H0240		
Fittings for base plate	741H0230				
Fittins for top hat rail	741C0243				

* Accessories included with the transformers (number only for spare part ordering).

Special primary or secondary current can be made on request.

Survey Chart – Saturation Transformers

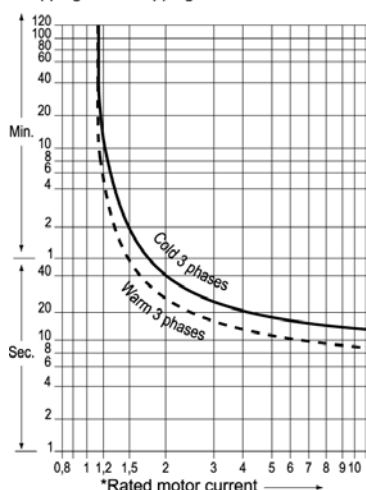


Rated motor current A	Number of primary turns	Saturation transformer Ratio-	Type	No.
1,3 – 2,0	25*	50/1	HF2A2	741B1091
2,0 – 3,1	16*	50/1	HF2A2	741B1091
2,6 – 4,2	12*	50/1	HF2A2	741B1091
3,5 – 5,6	9*	50/1	HF2A2	741B1091
3,9 – 6,25	8*	50/1	HF2A2	741B1091
4,5 – 7,14	7*	50/1	HF2A2	741B1091
6,3 – 10,0	5*	50/1	HF2A2	741B1091
9,45 – 15,0	5*	75/1	HF2A2	741B1092
12,6 – 20,0	5*	100/1	HF2A2	741B1090
18,9 – 30,0	4*	120/1	HF2B2	741B1093
25,2 – 40,0	3*	120/1	HF2B2	741B1093
31,5 – 50,0	1	50/1	HF2A2	741B1091
47,25 – 75,0	1	75/1	HF2A2	741B1092
63,0 – 100,0	1	100/1	HF2A2	741B1090
75,6 – 120,0	1	120/1	HF2B2	741B1093
107,0 – 170,0	1	170/1	HF2B2	741B1094
132,0 – 210,0	1	210/1	HF2B2	741B1095
198,0 – 300,0	1	300/1	HF2B2	741B1096
252,0 – 400,0	1	400/1	HF2B2	741B1097

*The transformer must be fitted with primary winding, see the numbers stated above as well as description p. 11

Saturation characteristic

Tripping time Tripping characteristic at 50 Hz



Saturation transformers for protection of motors with heavy starting

Motors designed to start heavy swing loads must be dimensioned so as to endure the thermal stresses caused by long starting cycles. When inserting a current transformer with saturation characteristic in front of a thermal overload relay with normal tripping characteristic, a tripping characteristic comes out which allows the long starting cycle without influencing the relay protection in the normal load and overload current area. HF2A2 and HF2B2 have the same external dimensions as HF3A and HF3B and the same accessories and mounting facilities (see page 12-14).

The transformers are dimensioned for 1 Amp. secondary thermal overload relay with a resistance per thermo circuit of 1.75-2.25 Ohm. At long distances between transformer and thermal overload relay the total resistance (relay+power cords) must be kept within the above mentioned area. This can be achieved by using larger power cord cross sections than really necessary for 1 Amp.

See tripping curve for secondary thermal relay with saturation transformer type HF2A2 and HF2B2 shown here.

Primary Winding, at lower Primary Current

At low operating currents it may be required to use current transformers with rated primary currents less than 50 A if an ample instrument deflection shall be obtained. At rated primary currents of 100 A or less, the available output of a through-primary current transformer may be too low for a given application. The solution in both cases is a standard through-primary current transformer provided with a primary winding.

In principle any through-primary current transformer can be provided with a primary winding. Considering space and required labour it is, however, advantageous to use a through-primary current transformer with the lowest possible rated primary current. Consequently the optimum choice is e.g. current transformer type HF3A.

Ordinary insulated wire of sufficient current carrying capacity for the primary circuit is suitable for the primary winding. **The number of primary turns is the number of times, the wire is taken through the transformer aperture.**

Apart from changing the ratio of transformation, the primary winding has no influence on the data of the transformer. Output and rated secondary current remain unchanged.

The number of turns necessary depends on the ratio of the rated primary current of the transformer employed and the required primary current.

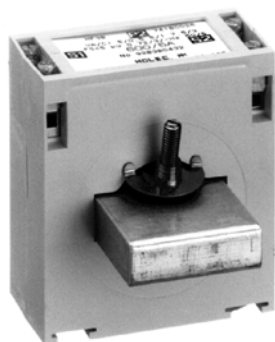
$$\text{No. of primary turns} = \frac{\text{Rated primary current}}{\text{Required primary current}} \quad (\text{Integer value})$$

The necessary number of primary turns, which shall be mounted on a HF3A to obtain a desired primary current, is tabulated below. When the required number of turns is found, it is possible to find the maximum cross section area of the primary winding through the table at the bottom of the page.

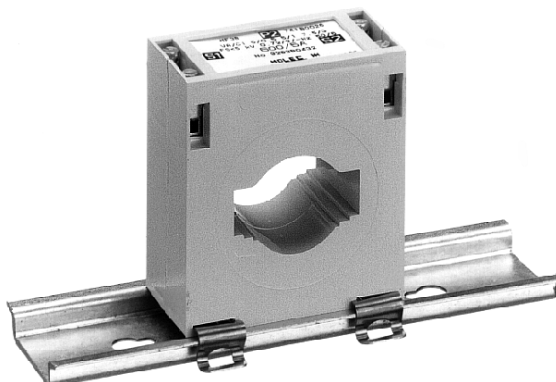


HF3A	Number of turns								Class	Class	Class
									0,5	1	3
Rated primary current in A	50	10	5	-	-	2	-	1	-	1	2
	60	12	6	4	3	-	2	-	-	1	2,5
	75	15	-	5	-	3	-	-	-	1,5	3
	80	16	8	-	4	-	-	-	-	2	3
	100	20	10	-	5	4	-	2	1,5	3	5
	125	25	-	-	-	5	-	-	2,5	3	5
	150	30	15	10	-	6	5	3	2,5	5	5
Required primary current in A		5	10	15	20	25	30	50	75	Rated output in VA	

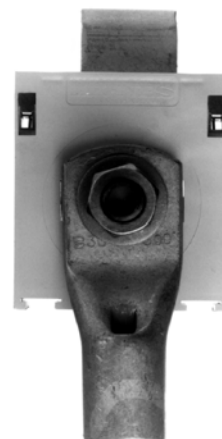
Number of turns for type HF3A	2	3	4	5	6	8	10	12	13	15	16	20	25	30
Rigid wire (1-7 strands) mm ²	-	-	10	6	6	4	4	2,5	2,5	2,5	2,5	1,5	1	1
Flexible wire (more than 7 strands) mm ²	25	16	10	6	6	4	2,5	2,5	2,5	-	-	-	-	-



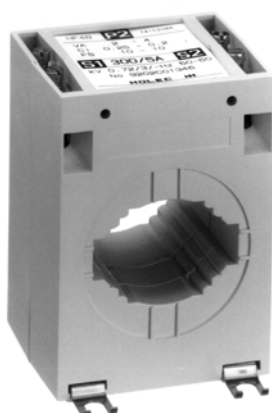
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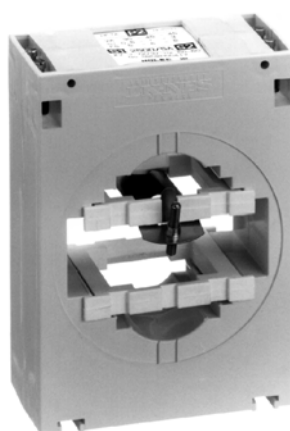
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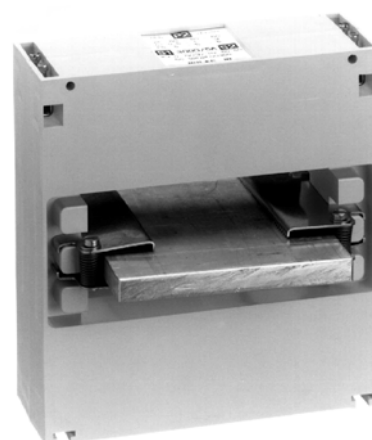
3.



4.



5.



6.

Above pictures show various forms of use of accessories:

1. Clamp (resilient stainless steel) for primary bar mounting:
Clamp is clipped on the transformer without using tools.

2. Fittings (resilient stainless steel) for mounting on top hat rail bar:
The fitting is clipped without using tools. Same fittings are used for HF4B, HF4C, HF5, HF6, HF7A and HF8A. Equivalent fittings are available for the types HF2A2, HF2B2, HF3A, HF3B and HF3DB.

3. Bush (tinned brass) for mounting between two bars or between bar (device terminal) and cable lugs.
The bush is mounted without using tools by pressing it into the aperture of the transformer.

4. Fittings (resilient stainless steel) for mounting on base plate:
These fittings are easily mounted by pushing them into slots in the enclosure of the transformer. Same fittings are used for HF4B, HF4C, HF5, HF6, HF7A and HF8A. Equivalent fittings are available for the types HF2A2, HF2B2, HF3A, HF3B and HF3DB.

5. Clamp (resilient stainless steel) for primary bar mounting:
The clamp is clipped on the transformer without using tools. Same fittings are used for HF4B, HF4C, HF5 and HF7A.

Inserts for small primary bars for HF7A. The insert (especially heat resistant plastic) are clipped without using tools and it makes it possible to mount a single bar in the large aperture of HF7A.

6. Clamp (stainless steel) for primary bar mounting:
The characteristic of these fittings is that they have only to be clamped to one of the parallel through bars. This means that distance pieces and mounting of such between the parallel bars can be avoided. At the same time the fitting is vibrationproof, i.e. because it makes it possible for the bars to move freely. Same fittings are used for HF6 and HF8A.

Accessories

Clamp for bar mounting



741B0030

For type:

No.

HF2A2, HF2B2, HF3A and HF3B
(1 pcs. per bag)

741B0030

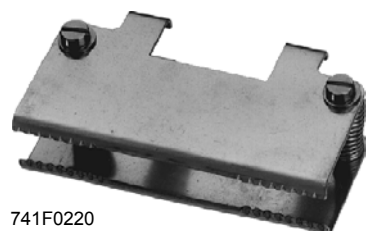
741B0233
741C0256

HF3DB
(1 pcs. per bag)

741B0233

*HF4B, HF4C, HF5 and HF7A
(1 pcs. per bag)

741C0256



741F0220

*HF6 and HF8A
(1 set = 2 pcs. per bag)

741F0220

* Accessories included with the transformers (numbers only for spare parts ordering)

Fittings for mounting on base plate



741B0230

For type:

No.

HF2A2, HF2B2, HF3A, HF3B and HF3DB
(12 pcs. per bag, 2 pcs. per transformer)

741B0230



741H0230

HF4B, HF4C, HF5, HF6, HF7A and HF8A
(12 pcs. per bag, 4 pcs. per transformer)

741H0230

Fittings for top hat rail bar



741B0231

For type:

No.

HF2A2, HF2B2, HF3A and HF3B
(1 set = 2 pcs. per bag)

741B0231

741B0243
741C0243

HF3DB
(1 set = 2 pcs. per bag)

741B0243

HF4B, HF4C, HF5, HF7A and HF8A
(1 set = 2 pcs. per bag)

741C0243

Bush for mounting between bar and cable lug

No.	For type
741B0321	HF2A2 and HF3A, for M10 screw (1 pcs. per bag)
741B0322	HF2B2 and HF3B, for M10 screw (1 pcs. per bag)



Insert

No.	For type:
741C0329	HF4B and HF5
741H0240	*HF7A * 1 pcs. included with the transformer (numbers only for spare parts or supplement ordering)



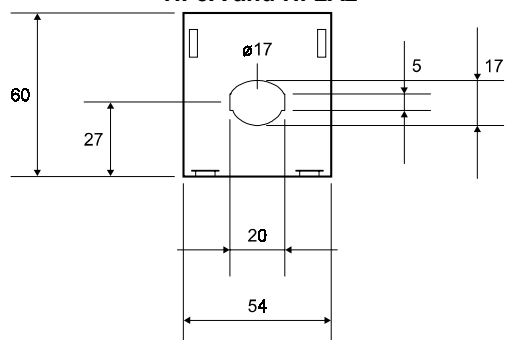
Sealable cover for secondary terminals

No.	For type:
741B0232	HF2A2, HF2B2, HF3A and HF3B (12 pcs. per bag, 4 pcs. per transformer)
741C0221	HF4B, HF4C, HF5, HF6, HF7A and HF8A (12 pcs. per bag, 4 pcs. per transformer)

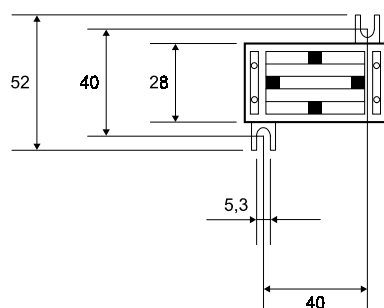
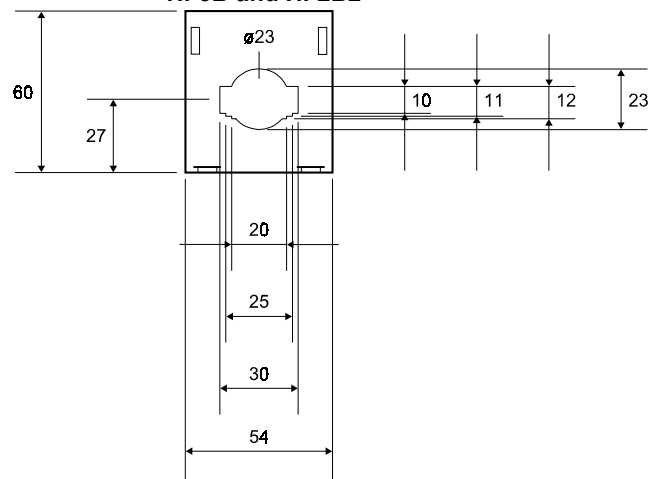


Dimensions

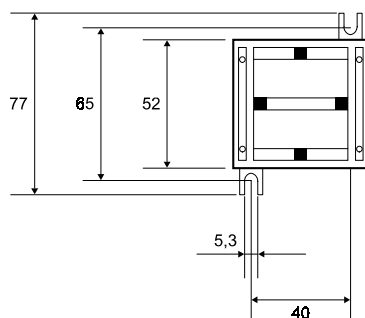
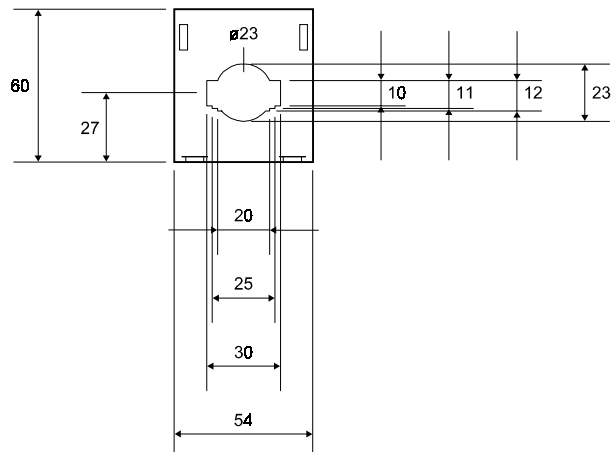
HF3A and HF2A2

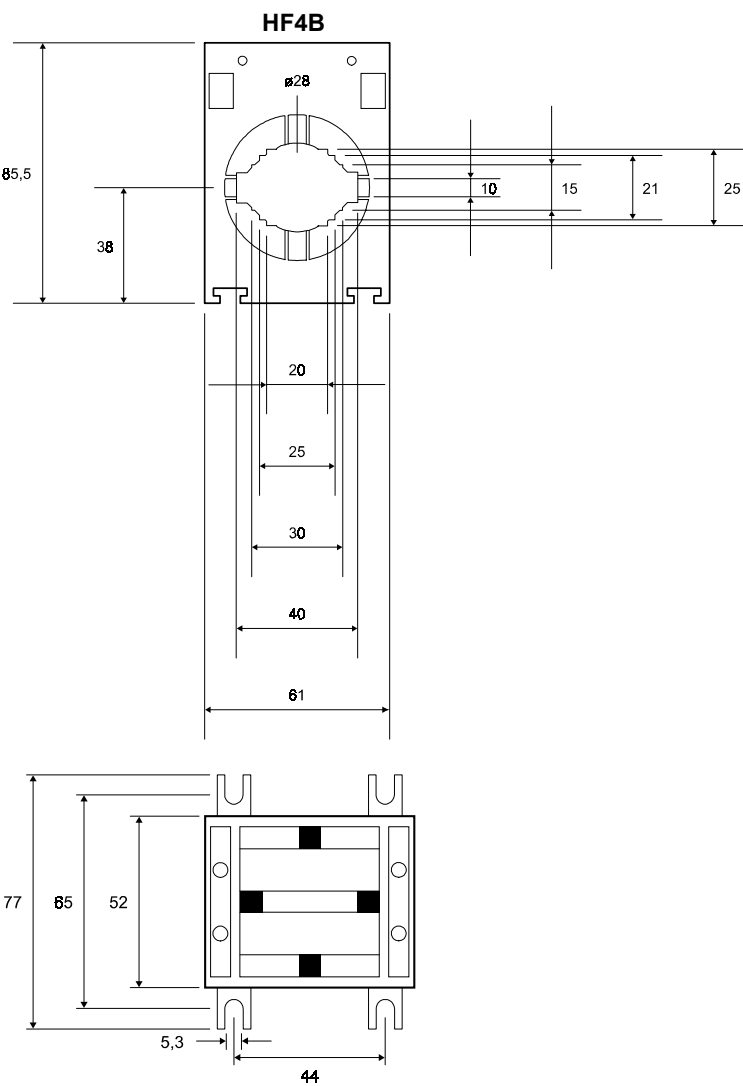
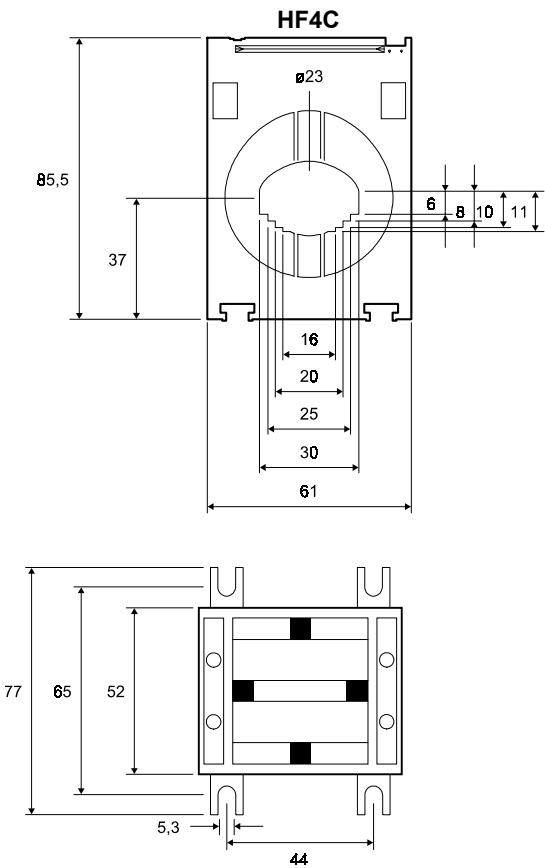


HF3B and HF2B2



HF3DB





Dimensions

