

INSTRUCTIONS

Comefri electronic cometer system cod.99998037



for fan series:

TLZ, THLZ FF, TZAF FF, NTHZ, VTZ, THLZ(*),
and Plenum wheels NPA, NPL, TE, NPE (*), PEAFF(*)

(*): OUT OF PRODUCTION

GENERAL POINTS

The Comefri Electronic Cometer system is designed to measure the airflow on centrifugal fans.

When correctly installed (i.e. respecting the installation procedure outlined in this document), the measuring system obtained with Electronic Cometer has an accuracy of $\pm 5\%$ (but for very low airflow the accuracy is reduced).

There must be absolutely no obstruction to the airflow before the metal sensor (see Figure 1 pos.1). Any components (such as an inlet guard) which cause an interruption in the airflow will render the readings inaccurate.

The air handling unit (AHU) should optimally have sufficient space between the fan's side plate and the AHU wall ($>0,5$ wheel diameter).

The Electronic Cometer is guaranteed to operate at temperatures between -20°C and $+40^{\circ}\text{C}$ and the digital measuring unit cod. 99998035 must be positioned in an ambient with temperature within 0°C and $+50^{\circ}\text{C}$. (see details in instruction of cod.99998035 - technical data).

COMPONENTS

A. The Electronic Cometer kit with the pressure sensor as tube (Figure 1)

consists of 5 components:

- (1) A cylindrical metal sensor with a plastic fitting
- (2) A metal support
- (3) The digital measuring unit

Extra:

- (4) Flexible plastic tubing ($\varnothing 6$ mm)
- (5) Feed supply 24 VAC 50/60 Hz or 24 VDC.

Max absorbed current 100 mA

Note:

user must obtain components (4) and (5).

The sensor can be used on fan series TLZ, VTZ, THLZ.
(Only for fans without Forefinger device)

B. The Electronic Cometer kit with the piezometric ring (Figure 2)

consists of 3 components:

- (3) The digital measuring unit

Extra:

- (4) Flexible plastic tubing ($\varnothing 6$ mm)
- (5) Feed supply 24 VAC 50/60 Hz or 24 VDC. Max absorbed current 100 mA

Note:

user must obtain components (4) and (5).

The piezometric ring is already installed on the inlet cone.

The piezometric ring must be used on plenum wheels and on fans with Forefinger.

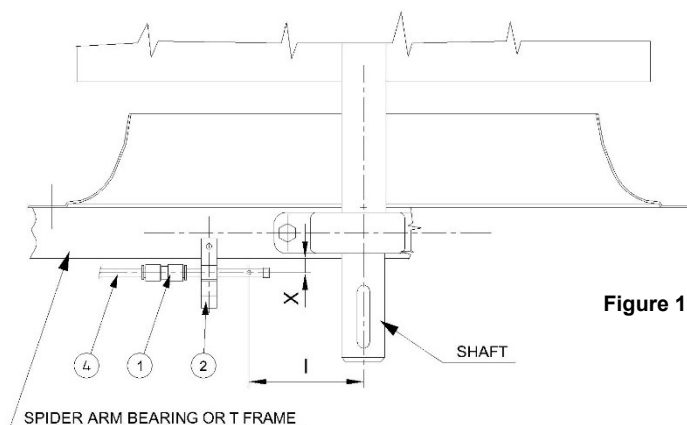


Figure 1

TABLE 1 K-FACTOR for Electronic Cometer kit with the pressure sensor as tube

Fan	x (mm)	L (mm)	K-factor [m ³ /s]	Fan	x (mm)	L (mm)	K-factor [m ³ /s]	Fan	x (mm)	L (mm)	K-factor [m ³ /s]
TLZ 160	7	47	0,046	THLZ 180	7	47	0,047	VTZ 315 R	14	78	0,164
TLZ 180	7	53	0,052	THLZ 200	7	47	0,055	VTZ 315 T1	7	127	0,174
TLZ 200	7	60	0,072	THLZ 225	7	51	0,069	VTZ 355 R	14	94	0,205
TLZ 225	14	45	0,115	THLZ 250	7	45	0,082	VTZ 355 T1	7	110	0,208
TLZ 250	7	50	0,108	THLZ 280	7	66	0,095	VTZ 400 R	14	78	0,252
TLZ 280	7	56	0,155	THLZ 315	7	49	0,133	VTZ 400 T1	7	157	0,256
TLZ 315	7	96	0,165	THLZ 355	14	83	0,177	VTZ 450 R	7	80	0,288
TLZ 355	14	73	0,229	THLZ 400	14	94	0,209	VTZ 450 T1	7	101	0,282
TLZ 400	7	81	0,258	THLZ 450	14	103	0,256	VTZ 500 R	14	115	0,362
TLZ 450	7	91	0,310					VTZ 500 T1	14	115	0,370
TLZ 500	7	103	0,426					VTZ 560 R	32	160	0,450
TLZ 560	7	173	0,430					VTZ 560 T1	14	190	0,450
TLZ 630	7	195	0,558					VTZ 630 R	32	210	0,575
TLZ 710	7	218	0,775					VTZ 630 T1	14	240	0,660
TLZ 710 T	14	210	0,855					VTZ 710 R	32	115	0,800
TLZ 800 T	14	238	0,983					VTZ 710 T1	14	260	0,755
TLZ 900 T	14	266	1,359					VTZ 800 T1	32	270	0,990
TLZ 1000 T	14	308	1,590					VTZ 900 T1	32	235	1,200
								VTZ 1000 T1	14	256	1,480

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(*) : OUT OF PRODUCTION

PIEZOMETRIC RING AT THE INLET CONE

Plenum wheels, NPL, NPA, TE, NPE, PEAFF are equipped with a measuring device "Cometer Ring" (Figure 2) for control and measure of airflow. Cometer Ring consists of one or more static pressure measuring points mounted in the inlet cone.

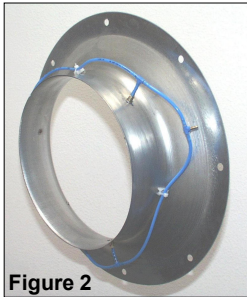


Figure 2

Measuring points are connected together by a flexible tube ring.

The "Cometer Ring" can be used also on the fans, particularly on fans with Forefinger where sensor tube is not applicable.

MEASURING AIRFLOW WITH THE ELECTRONIC COMETER

Attach flexible tubing (4) leading from metal sensor (1) or from piezometric ring to the connection (-) of the **digital measuring unit** indicated in instructions of cod.9998035 (Fig.3). Another flexible tubing should be connected from the connection (+) of the **digital measuring unit** to the air handling unit at the inlet side of the fan in the vicinity of the fan.

This area must be a suitable region for measuring static pressure and not have any obstacles present (such as filters) in between the fan and the point where the end of the flexible tubing is placed.

The pressure difference between connection (+) and (-) is measured by the **digital measuring unit** and converted in the airflow volume of the Comefri fan in use. This computation is carried out with a mathematical expression using coefficients calibrated (K-factor) for every machine (TABLE 1 and TABLE 2) as explained in instructions of cod.99998035.

$$\text{Air flow } q = K \cdot (\Delta p)^{1/2} \text{ [m}^3/\text{s] at } 20^\circ\text{C}$$

TABLE 2

K-FACTOR for Electronic Cometer kit with the piezometric ring

Fan	K-factor [m ³ /s]	Fan	K-factor [m ³ /s]	Fan	K-factor [m ³ /s]	Fan	K-factor [m ³ /s]	Fan	K-factor [m ³ /s]
TZAF FF 315 R	0,076	NTHZ 315 R	0,076	VTZ 315 R	0,077	NPL 200	0,011	TE 180	0,008
TZAF FF 315 T1	0,072	NTHZ 315 T1	0,072	VTZ 315 T1	0,072	NPL 225	0,014	TE 200	0,011
TZAF FF 355 R	0,096	NTHZ 315 T2	0,071	VTZ 355 R	0,098	NPL 250	0,018	TE 225	0,014
TZAF FF 355 T1	0,092	NTHZ 355 R	0,096	VTZ 355 T1	0,094	NPL 280	0,022	TE 250	0,017
TZAF FF 355 T2	0,090	NTHZ 355 T1	0,092	VTZ 400 R	0,117	NPL 315	0,027	TE 280	0,021
TZAF FF 400 R	0,119	NTHZ 355 T2	0,090	VTZ 400 T1	0,113	NPL 355	0,036	TE 315	0,027
TZAF FF 400 T1	0,113	NTHZ 400 R	0,117	VTZ 450 R	0,140	NPL 400	0,050	TE 355	0,034
TZAF FF 400 T2	0,108	NTHZ 400 T1	0,114	VTZ 450 T1	0,135	NPL 450	0,064	TE 400	0,044
TZAF FF 400 T2L	0,102	NTHZ 400 T2	0,109	VTZ 500 R	0,181	NPL 500	0,078	TE 450	0,057
TZAF FF 450 R	0,150	NTHZ 400 T2L	0,107	VTZ 500 T1	0,175	NPL 560	0,096		
TZAF FF 450 T1	0,143	NTHZ 450 R	0,143	VTZ 560 R	0,237	NPL 630	0,125	PEAFF 315	0,036
TZAF FF 450 T2	0,137	NTHZ 450 T1	0,144	VTZ 560 T1	0,230	NPL 710	0,163	PEAFF 355	0,049
TZAF FF 450 T2L	0,129	NTHZ 450 T2	0,138	VTZ 630 R	0,295	NPL 800	0,203	PEAFF 400	0,056
TZAF FF 500 R	0,181	NTHZ 450 T2L	0,136	VTZ 630 T1	0,310	NPL 900	0,251	PEAFF 450	0,079
TZAF FF 500 T1	0,177	NTHZ 500 R	0,180	VTZ 710 R	0,413	NPL 1000	0,308	PEAFF 500	0,100
TZAF FF 500 T2	0,159	NTHZ 500 T1	0,178	VTZ 710 T1	0,417	NPL 1120	0,385	PEAFF 560	0,124
TZAF FF 500 T2L	0,159	NTHZ 500 T2	0,171	VTZ 800 T1	0,500	NPL 1250	0,445	PEAFF 630	0,163
TZAF FF 560 R	0,227	NTHZ 500 T2L	0,167	VTZ 900 T1	0,600	NPL 1400	0,558	PEAFF 710	0,205
TZAF FF 560 T1	0,215	NTHZ 560 R	0,230	VTZ 1000 T1	0,790			PEAFF 800	0,251
TZAF FF 560 T2	0,200	NTHZ 560 T1	0,217			NPA 250	0,023	PEAFF 900	0,318
TZAF FF 560 T2L	0,200	NTHZ 560 T2	0,205	THLZ FF 180	0,017	NPA 280	0,029	PEAFF 1000	0,394
TZAF FF 630 R	0,303	NTHZ 560 T2L	0,210	THLZ FF 200	0,021	NPA 315	0,036	PEAFF 1120	0,490
TZAF FF 630 T1	0,290	NTHZ 630 R	0,305	THLZ FF 225	0,027	NPA 355	0,048	PEAFF 1250	0,610
TZAF FF 630 T2	0,273	NTHZ 630 T1	0,291	THLZ FF 250	0,033	NPA 400	0,062	PEAFF 1400	0,753
TZAF FF 630 T2L	0,266	NTHZ 630 T2	0,271	THLZ FF 280	0,041	NPA 450	0,069	PEAFF 1600	0,932
TZAF FF 710 R	0,405	NTHZ 630 T2L	0,275	THLZ FF 315	0,052	NPA 500	0,093		
TZAF FF 710 T1	0,390	NTHZ 710 R	0,405	THLZ FF 355	0,066	NPA 560	0,118	NPE 315	0,027
TZAF FF 710 T2	0,355	NTHZ 710 T1	0,390	THLZ FF 400	0,086	NPA 630	0,148	NPE 355	0,034
TZAF FF 710 T2L	0,355	NTHZ 710 T2	0,360	THLZ FF 450	0,112	NPA 710	0,200	NPE 400	0,044
TZAF FF 800 T1	0,485	NTHZ 710 T2L	0,360			NPA 800	0,245	NPE 450	0,056
TZAF FF 800 T2	0,475	NTHZ 800 T1	0,485	THLZ 180	0,016	NPA 900	0,315	NPE 500	0,068
TZAF FF 800 T2L	0,460	NTHZ 800 T2	0,475	THLZ 200	0,020	NPA 1000	0,408	NPE 560	0,086
TZAF FF 900 T1	0,600	NTHZ 800 T2L	0,465	THLZ 225	0,026	NPA 1120	0,460	NPE 630	0,106
TZAF FF 900 T2	0,590	NTHZ 900 T1	0,600	THLZ 250	0,032	NPA 1250	0,600	NPE 710	0,143
TZAF FF 900 T2L	0,589	NTHZ 900 T2	0,590	THLZ 280	0,040	NPA 1400	0,753	NPE 800	0,184
TZAF FF 1000 T1	0,750	NTHZ 900 T2L	0,580	THLZ 315	0,050	NPA 1600	0,983	NPE 900	0,234
TZAF FF 1000 T2	0,750	NTHZ 1000 T1	0,750	THLZ 355	0,065			NPE 1000	0,277
TZAF FF 1000 T2L	0,750	NTHZ 1000 T2	0,750	THLZ 400	0,083			NPE 1120	0,402
TZAF FF 1120 T1	0,941	NTHZ 1000 T2L	0,750	THLZ 450	0,104			NPE 1250	0,430
TZAF FF 1120 T2	0,941	NTHZ 1120 T1	0,941					NPE 1400	0,574
TZAF FF 1250 T1	1,172	NTHZ 1120 T2	0,941						
TZAF FF 1250 T2	1,172	NTHZ 1250 T1	1,172						
		NTHZ 1250 T2	1,172						



**DOUBLE INLET AIRFOIL FANS – TZAF FF
ZWEISEITIGSAUGENDE AIRFOIL VENTILATOREN – TZAF FF
VENTILATEURS AIRFOIL DOUBLE ASPIRATION – TZAF FF
VENTILATORI AIRFOIL A DOPPIA ASPIRAZIONE – TZAF FF**

C-0075 March 2015

8.16. Airflow measuring device

The TZAF FF fans can be fitted with a device for measuring and controlling the air volume, with a tolerance of 5 to 10%, (normal operating conditions). The measuring device accuracy is guaranteed by an extensive series of tests performed in our state of art test laboratory, for the whole fan range dimensions. The device consist of two or more static pressure measuring points, mounted directly into both inlet cones. The measuring points are manifolded together via a flexible pipe ring. Therefore only a single pipe connection to the pressure measuring device is required.. When the fan is installed in an AHU, the pressure differential to be measured is between the suction chamber of the AHU (where the fan is installed) and the flow measuring device (see drawing page.51). This pressure difference can be converted into the volume flow by the following formula:

8.16. Volumenstrom – Meßeinrichtung

Die Ventilatoren TZAF FF können mit einer Einrichtung zur Volumenstrombestimmung und -überwachung ausgestattet werden (Abweichung 5-10% unter normalen Betriebsbedingungen). Um die Genauigkeit zu gewährleisten, wurden in unserem Labor für jeden Ventilator der TZAF FF -Reihe entsprechende Kalibrierfaktoren ermittelt. Die Volumenstrom-Meßeinrichtung besteht aus zwei oder mehreren Meßstellen in jeder Einströmdüse, die durch eine Ringleitung (Innendurchmesser 3-5 mm) verbunden sind. Als der Ventilator in ein Gerät eingebaut wird, muß der Differenzdruck zwischen Gerät –Ansaug und Ringleitung gemessen werden (siehe Schema auf Seite 51). Dieser Differenzdruck wird wie folgt zur Ermittlung des Volumenstromes verwendet:

8.16. Dispositif pour la mesure du débit

Les ventilateurs peuvent être équipés avec un dispositif pour la mesure et le contrôle du débit en conditions normales d'utilisation, avec une marge d'erreur maximum de lecture entre le 5 et le 10%. Afin de garantir ce degré de précision sur l'indication du débit, le mesureur a été calibré pour chaque taille de la série TZAF FF dans le Laboratoire d'Essais Aérauliques Comefri. Le système consiste à placer deux ou plusieurs prises statiques de pression sur les pavillons d'aspiration connectés entre elles par un circuit annulaire, c'est-à-dire un tube avec diamètre interne entre 3 et 5 mm fixé aux pavillons par des attaches prévues à cet effet. Quand le ventilateur est installé dans une unité la différence de pression qui doit être mesurée est entre l'aspiration de l'unité et la prise annulaire prévue sur les pavillons (voir schéma à page 51). La différence de pression obtenue est la Δp à utiliser pour la définition du débit.

8.16. Dispositivo per la misurazione della portata

I ventilatori possono essere dotati di un dispositivo per la misurazione ed il controllo della portata che nelle condizioni normali di impiego comporta un errore massimo di lettura compreso tra il 5 e il 10%. Per garantire il grado di precisione nella indicazione della portata, il misuratore è stato calibrato nel Laboratorio Prove Aerauliche Comefri per ogni ventilatore della serie TZAF FF. Il sistema consiste di due o più prese statiche di pressione realizzate su entrambi i boccagli di aspirazione collegati tra loro mediante un circuito anulare con apposito attacco per il tubo di diametro interno compreso tra i 3 e i 5 mm. Quando il ventilatore è inserito in una unità, la differenza di pressione che deve essere misurata è tra l'aspirazione dell'unità e la presa anulare predisposta sui boccagli (vedi schema pag.51). La differenza di pressione statica così ottenuta è la Δp da utilizzarsi nella espressione della portata.

$$\dot{V} = K \sqrt{\frac{2}{\rho} \cdot (\Delta p)}$$

Airflow	Volumenstrom	Débit	Portata	\dot{V} [m³/h]
Calibration factor depending on fan size	Kalibrierfaktor abhängig von dem Ventilatorgröße	Facteurs de calibrage relatifs à la taille du ventilateur	Fattore di calibrazione dipendente dalla grandezza del ventilatore	$K^{(*)}$
Air density	Luftdichte	Densité d'air	Densità dell'aria	ρ [kg/m³]
Differential pressure	Differenzdruck	Différence de pression	Differenza di pressione	Δp [Pa]

(*) Our maintenance manual details the relevant calibration factor (K)

(*) K-Werte befinden sich auf der Gebrauch- und Wartungsanleitung

(*) Les valeurs de K sont sur le manuel d'utilisation et d'entretien

(*) I valori di K sono riportati sul manuale di uso e manutenzione

The device with the measuring ring (Fig. 11) can be used with the Electronic Cometer (Fig.10).

Das System mit der Ringleitung (Bild 11) dagegen dem Electronic Cometer (Bild.10).



Fig.10

Le deuxième système à circuit annulaire (Fig.11), può essere abbinato all' Electronic Cometer (Fig.10).

Les ventilateurs doivent être demandés avec système de mesure installé, au moment de la commande.

The pressure measuring device must be ordered with the fan, as it must be factory installed.

Die Ventilatoren müssen mit der bereits installierten Meßeinrichtung bestellt werden.

I ventilatori devono essere richiesti all'atto dell'ordine di installazione.

8.16.1. Fan installation recommendations

The distance between the fan inlet and the AHU walls "R" (Fig.11) is vital for a correct fan operation. Here attached useful indications quoted in the fans literature. Known the air velocity at the fan inlet, and the distance of the fan inlet from the AHU walls, the Δp_U can be obtained from graph 8.16. For a correct fan selection, Δp_U have to be added to the circuit total losses.

8.16.1. Anweisungen zum Einbau der Ventilatoren in den Einheiten

Der Abstand "R" (Bild.11) ist die Voraussetzung eines guten Betriebs des Ventilators. In der Folge wird es erwähnt was in der Fachliteratur um das Betreffende zu finden ist. Sind die Luftgeschwindigkeit beim Ansaug des Ventilators v und der Abstand R bekannt, kann man aus der Grafik 8.16 Δp_U ermitteln, das dem Gesamtverlust der Anlage zu addieren ist, um den Ventilator korrekt auszuliegen.

8.16.1. Instructions sur l'installation des ventilateurs dans les unités

La distance "R" (Fig.11) est très importante pour le bon fonctionnement du ventilateur. Vous trouvez de suite ce que la littérature spécialisée mentionne à ce propos. En connaissant la vitesse de l'air à l'aspiration du ventilateur v , et la distance R, du graphique 8.16 on obtient Δp_U qui doit être additionnée aux pertes totales du circuit afin de sélectionner correctement le ventilateur.

8.16.1. Indicazioni sulla installazione dei ventilatori nelle unità.

La distanza "R" (Fig.11) è di fondamentale importanza per il buon funzionamento del ventilatore. Di seguito si riporta quanto indicato nella letteratura specializzata sull'argomento. Nota la velocità dell'aria all'aspirazione del ventilatore v , e la distanza R, dal grafico 8.16 si ricava Δp_U che deve essere sommata alle perdite totali del circuito al fine di selezionare correttamente il ventilatore.

No influence	Kein Einfluß	Pas d'influence	Nessuna influenza	$R = 0,92 \times \phi I$
Zone 1	Zone 1	Zone 1	Zona 1	$R = 0,75 \times \phi I$
Zone 2	Zone 2	Zone 2	Zona 2	$R = 0,50 \times \phi I$

Distance of the fan inlet from the AHU walls	Abstand zwischen Ansaug und Einheitwand	Distance entre l'aspiration et la paroi de l'unité	Distanza della bocca di aspirazione dalla parete dell'unità	R [mm]
Diameter of the inlet of the fan that coincide with nominal wheel diameter	Ansaugdiameter, identisch mit dem nominellen Laufraddiameter	Diamètre d'aspiration, correspondent au diamètre nominal de la turbine	Diametro di aspirazione, coincide con il diametro nominale della girante	ϕI [mm]
Pressure loss due the AHU walls influence	Druckverlust durch die Einheitwände	Perte de pression due aux parois de l'unité	Perdita di pressione dovuta alla presenza delle pareti dell'unità	Δp_U [Pa]
Air velocity at the fan inlet	Luftgeschwindigkeit beim Ansaug des Ventilators	Vitesse de l'air à l'aspiration du ventilateur	Velocità dell'aria all'aspirazione del ventilatore.	v [m/s]

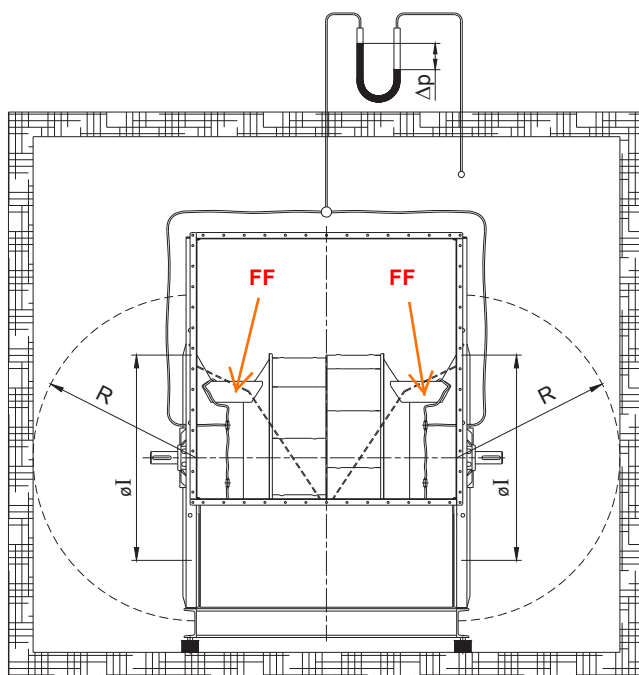


Fig.11

FF = Forefinger device
