Volume

1

INSTALLATION OF HPAC UNITS

Cabling general overview in order to improve the EMC

INDEX OF CHAPTER 1:

Hirobus Cabling

Chapter

1

1. Introduction

This chapter has been produced to give technical guidelines on how to make a good installation of a Hirobus network, with special attention to the wiring connections.

The information contained in this checklist is a mere complementing tool for the engineer whose responsibility is to design and install the system: his personal qualification implies the capacity to set up installations in accordance with the norms and laws of the country in which he operates.

This document will be kept updated in the Web-site www.hiross.it/pde.

2. EMC - Electromagnetic Compatibility

What is it and how can it influence the system?

EMc or *electromagnetic compatibility* is the capability of the system to resist against external disturbances and to minimise the emission of disturbances from inside. Liebert Hiross air-conditioners are tested by a Competent Body : an air conditioner sample with normal configuration is checked under electromagnetic disturbances and it has to overtake the tests otherwise the units cannot be sold in the European market and in those markets where the CE mark is required.

Looking at the specific controls, Liebert Hiross *Microface* is judged by the Competent Body "immune" from disturbances conducted into the main power supply up to 4 KV. These disturbances are characterised by high voltage and low energy and Microface is not normally damaged by them. However, disturbances stronger than the tested ones can influence the behaviour of the control in the following ways:

- Fluctuation of temperature on those units where the PTC sensor is installed
- Unit self reset
- Unit shutdown
- False alarm generation

The generation of spikes (disturbances) is something typical of switching systems (frequency converters, triac controllers, inductive loads, UPSs, diesel generators …) and if they do not work according to the levels defined by European standards (the same we use to test our units: EN50081-1, EN50082-2) they could influence our control systems.

How to solve the problem

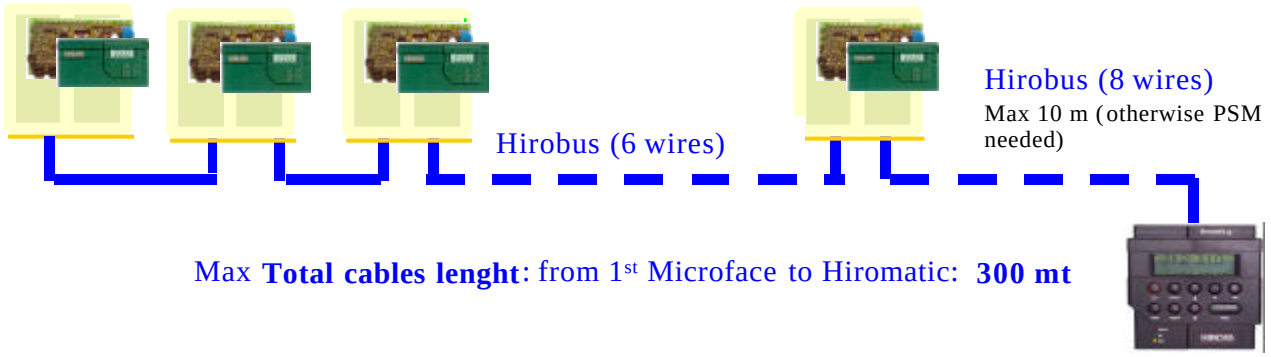
The best solution would be to limit the problem at the source but this is in most cases impossible. The alternative is to avoid the disturbance to affect our unit through external connections and/or the power supply cable. In particular what follows is a list of mandatory rules to respect.

3. Hirobus cable installation

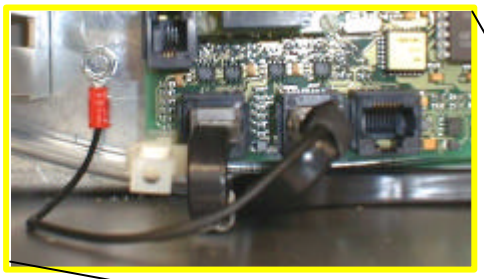
Hirobus cables used to interconnect up to 16 Microface (or 8 when there is a connection to Hirolink) need to be screened and installed according to the instructions given in the user manual (for example see Microface & Hiromatic AC WXG160 cod. 271618/272038 - rev. 19/10/1999). It has to be a cable type "connector TVK 0067 screened" or equivalent and the connector type must be an 8-poles RJ45 Modular Jack Interconnection system with only the central 6 poles connected. *IT IS NOT ALLOWED TO CUT the cable and JOIN it with TERMINALS*.

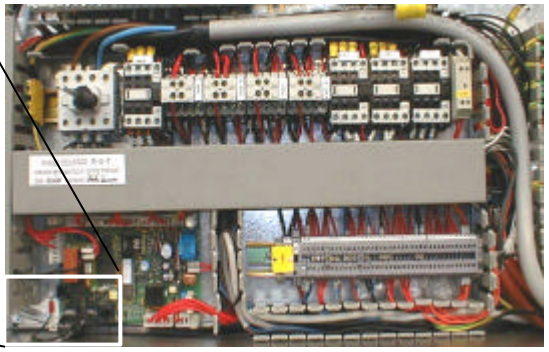
The cable has to be 1 piece only from connector A to connector B

Example of installation:



Example of installation wiring:





POWER CABLE PATH:

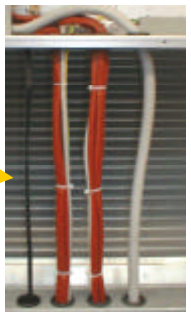
- Please follow the path indicated in the manual delivered with the unit

HIROBUS CABLE:

- The cable must be SCREENED
- The screen of the cable must be DIRECTLY CONNECTED WITH THE ELECTRICAL PANEL PLATE (EARTH).

HIROBUS PATH:

- The power cables and Hirobus have to be kept at distance following different paths



The maximum cable length between the first Microface and the last Microface or Hiromatic has to be of 300 meters maximum. The cables between the units have to be positioned not in the same channels of switching exchange cables or power cables and they have to run far away from any cable which could generate disturbances.

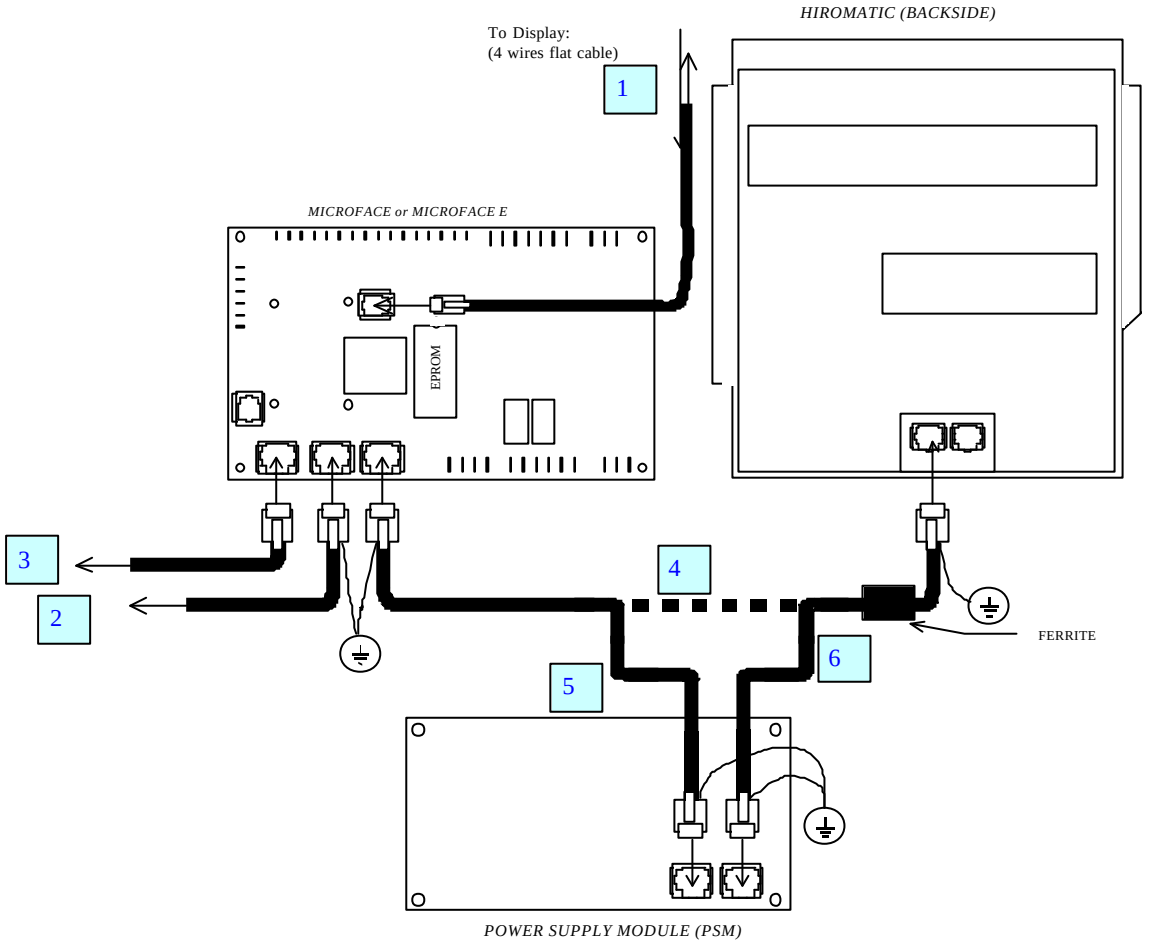
The recommended solution is to install the Hirobus cable inside a screened channel (it can be simply a metal pipe). Obviously, it cannot be the one containing other cables, like the switching exchange cable or power cables, because they represent one of the major disturbances sources mentioned at page 3.

4. How to make a network with Hirobus

Hirobus networks between Microfaces (LAN) are built with 6-wires cables.

8-wires cables are used to connect sensors (Humitemp, EEAP and Hirosensor 2T) and Hiromatic to Microface or to a PSM (the Power Supply Module is needed when Hiromatic is required at a distance from Microface higher than 10 mt. In this case you should consider the Hiromatic remote box which contains the PSM. The connection Microface-PSM is with a 6-wires cable while inside the box the connection PSM-Hiromatic is realised with an 8-wires cable).

Example of connections:



1. Microface to Microface Display
2. Microface to Microface (LAN)
3. Microface to accessories
4. Microface to Hiromatic G
5. Microface to PSM
6. PSM to Hiromatic G

CONNECTIONS existing in a Microface / Hiromatic system	**HIROBUS CABLE** TYPE	**CONNECTOR**
1. Microface Display to Microface	**4-wires** flat cable	RJ9 Connector with 4 poles (4 positions- 4 contacs)
2. Microface to Microface (LAN)	**6-wires** screened flat cable	RJ45 Connector with 8-poles (8 positions – 8 contacts with 2 poles on the sides not used)
3. Microface to accessories : Humitemp, Hirosensor 2T and EEAP sensors	**8-wires** flat cable; it must be screened (and connected to the Earth) if the sensor is positioned outside the unit.	RJ45 Connector with 8-poles (8 positions – 8 contacts)
4. Microface to Hiromatic (built on the unit)	**8-wires** flat cable	RJ45 Connector with 8-poles (8 positions – 8 contacts)
5. Microface to PSM (Power supply module) inside the Hiromatic box. (therefore Microface to Hiromatic box)	**6-wires** screened flat cable	RJ45 Connector with 8-poles (8 positions – 8 contacts with 2 poles on the sides not used)
6. PSM to Hiromatic (already connected in the Hiromatic Box)	**8-wires** flat cable	RJ45 Connector with 8-poles (8 positions – 8 contacts)

N.B. All cables not staying inside the unit must be screened. All screened cables must be connected to Earth on both sides.

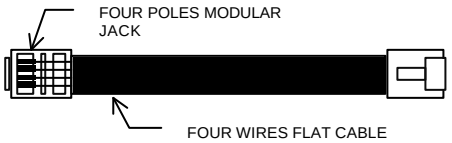
WARNING: please note that a wrong connection could cause serious problems to the electronic devices (Microface and Hiromatic); for this reason we strongly recommend you to use only first quality products or to buy the cables directly from Liebert Hiross: set sizes or loose cables and connectors are available, as well as building tools:

1

4-WIRES HIROBUS CABLE WITH 4-POLES CONNECTORS

Microface Display to Microface: the max length possible is 450 mm.

Standard cable with Microface Display



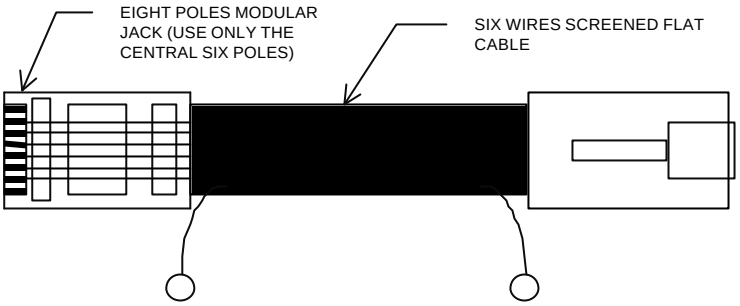
Optional cable for Microface Display

Part number	Length	Description
275598	41 cm	4 wires cable with 4 poles connector + ferrite

6-WIRES HIROBUS CABLE WITH 8-POLES CONNECTORS

2

5



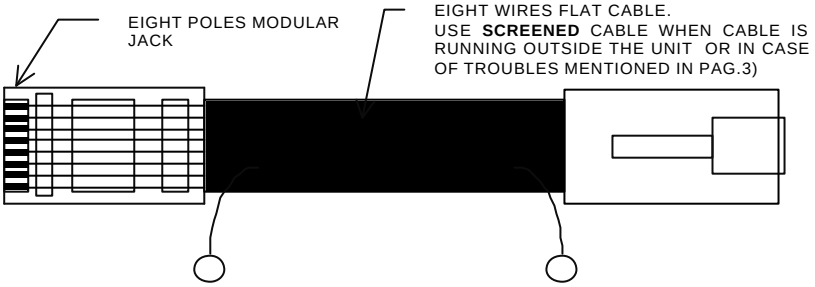
Part number	Length	Description
275647	3 m	6 wires screened flat cable + connectors MM
275637	5 m	6 wires screened flat cable + connectors MM
275633	10m	6 wires screened flat cable + connectors MM
275638	25 m	6 wires screened flat cable + connectors MM
275639	50 m	6 wires screened flat cable + connectors MM

8-WIRES HIROBUS CABLE WITH 8-POLES CONNECTORS

3

4

6



Part number	Length	Description
275607	1 m	8 wires flat cable + connectors MM (only inside unit)
275606	2 m	8 wires flat cable + connectors MM (only inside unit)
275608	3 m	8 wires flat cable + connectors MM (only inside unit)
275635	5 m	8 wires screened flat cable + connectors MM
275636	10 m	8 wires screened flat cable + connectors MM
275642	25 m	8 wires screened flat cable + connectors MM

The codes for the loose cables, connectors and tools are:

	Part number	Lenght	Description
1	275625	By metre	6 wires screened flat cable
2	275626	By metre	8 wires screened flat cable
3	275612	(1 piece)	8-poles connector
4	275641	(1 piece)	Clamping tool for 4 poles / 6 poles
5	275613	(1 piece)	Clamping tool for 8 poles

5. Screened power supply cable

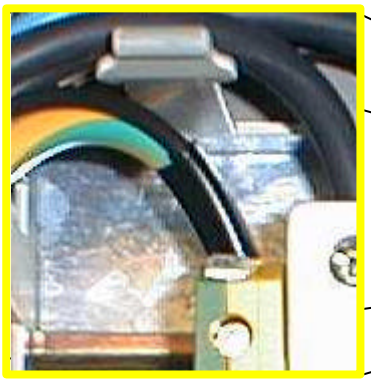
Power cables can be of different sizes; the size does not depend only on the absorbed power but also on the distance between the distribution panel and the unit itself. In addition to that, the power cable is in most cases double insulated, which makes the positioning and handling inside the unit even more difficult.

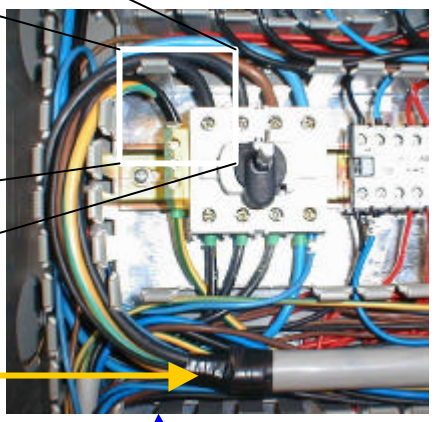
For those installations where there is a big power supply cable, it is necessary to use an external junction box to interface the cable coming from the Main Distribution Panel and going into the Main disconnector switch.

The following examples are referring so some kind of unit installations in order to give some general guidelines. Installations can also be different to the ones shown depending on the type of units considered.

Examples of installation

POWER CABLE:
- The cable must be SCREENED
- The screen of the cable must be CONNECTED TO EARTH .





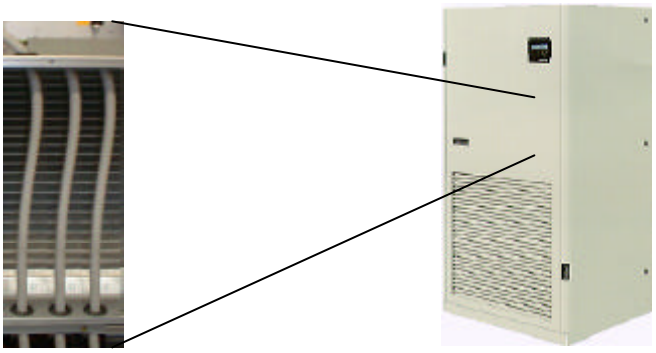
EXTERNAL INSULATION:
- The cable external insulation must be removed, close to the UNIT MAIN SWITCH

POWER CABLE PATH:
- Please follow the path indicated in the manual delivered with the unit
- The power cables and Hirobus have to be kept at distance following different paths.

6. Outgoing cables

All cables coming out of the unit have to be screened and the screen has to be connected to an earth terminal. Outgoing cables are:

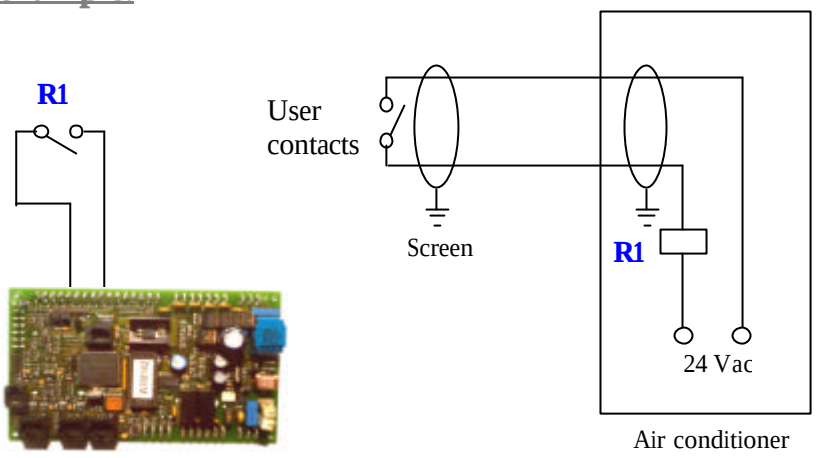
1. *Alarm relay cable*
2. *Remote on off cable*
3. *Fire shut down cable*
4. *Compressor status, fan status, electrical heater status cables*



7. Duplication of external contacts

All contacts which are coming from outside, like the Remote on off, User input, Fire shut down contacts, have to be connected to a *relay* inside the unit. The relay is then connected to the relevant input. All relays have to be fitted with gold contacts.

Wiring example:

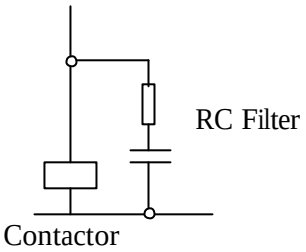


8. RC filters installation

RC filters need to be installed on coils and conductors (especially for those components which are frequently activated, like fill-drain valves, electrical heaters contactors , etc).

Such installation is in most cases carried out in the factory but in case of disturbances on the control system we suggest to check whether the unit components are equipped with RC or not.

Example of RC installation



9. Special Intervention

Hirobus cables have 6 wires, 4 of which are used for communication, 1 is used to signal "ground" and 1 could be used for network reset.

The Network Reset Pin is not managed by the control and in normal conditions it does not have any influence on the system. However, in disturbed environments the presence of this pin could influence the stability of the Microface-Hiromatic system.

Therefore only in those peculiar cases of anomalies in installations where everything is done according to the instructions given in this Guide, we indicate the possibility to remove the pin n°3 from all the Hirobus cables (on both ends) present in the network. Such operation needs a very skilful technicians and a special care to check that no Hirobus cable in the system is left with that "unused" pin.

Example of Hirobus wiring