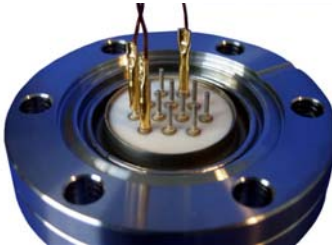
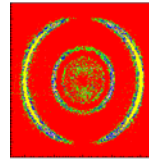


The FT4/12/16TP signal decoupler



The **RoentDek** FT4TP, FT12TP and FT16TP signal decoupler sets are specific product assemblies to link **RoentDek** MCP-based detectors, i.e. **DET**, **DLD** and **HEX** with high-voltage supplying modules (such as **RoentDek** HV2/4) and with front-end electronics devices (e.g. **RoentDek** FEE) for further processing of detector signals to retrieve time and position coordinates for detected particles. Detailed functional descriptions are given in the respective detector manuals.

The product assembly may also include flange-mounting gear for detectors, e.g. **FT12TP100** for mounting a **DLD40** on a **DN100CF** (ICF153) flange. Drawings of mounting gears are provided on the **RoentDek** website.



The product assemblies contain in-vacuum cables/connectors from the detector to special signal feedthroughs, for example a 12-pin feedthrough (**FT12**) on a **DN40CF** flange (see above) for delay-line detectors (e.g. **DLD**), while a **DET** timing detector requires a fourfold set of standard MHV or SHV feedthroughs, usually also grouped on a **DNCF40** (ICF70) flange (**FT4**, **FT4shv**). The combination of **FT4** and **FT12(hex)** forms the **FT16** feedthrough assembly for connecting **HEX** detectors.



Special plugs containing signal decoupling electronics circuits are connected to the air-side of these feedthroughs. They have one or several high voltage inputs (usually via SHV sockets) and signal outputs (usually as coaxial “lemo” sockets) and serve to separate (decouple) the weak high frequency signal, induced by particle impact on a detector contact from the high voltage (DC) load needed for MCP operation.



Single-channel **HighFrequencySignalDecoupler (HFSD)** sets are used for the **DET** timing detectors. Since decent signal quality requires control of signals potentially leaking from other detector parts there is also an AC-terminating version (**HFST**) of this plug. Combinations of two to four of these plugs are delivered as parts of the **FT4TP** product assembly for readout of **DET**.

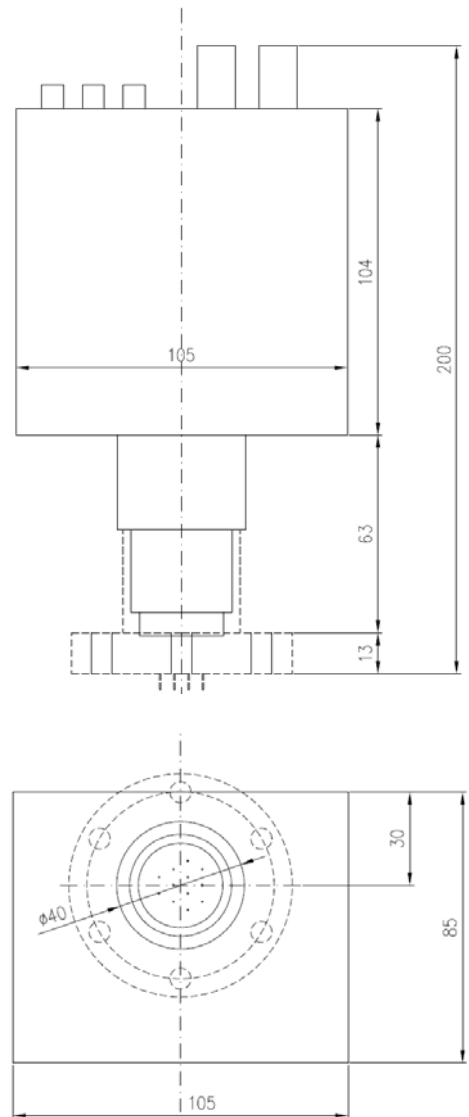
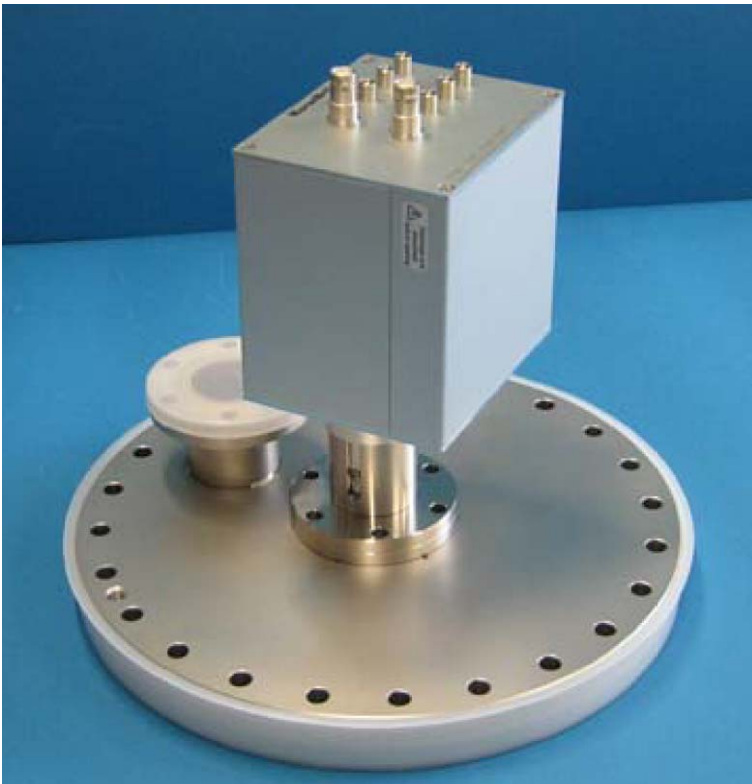
The multi-channel **12TP** decoupler serves as the link between **DLD** and the **FEE2(x)** or **FEE5(x)** electronics sets and to high voltage supplies (e.g. **HV2/4**). It is usually supplemented by a **BA3** battery box for supplying both anode wire voltages from a single high voltage source. The version **12TPz** requires only two independent high voltage inputs are for completely biasing a **DLD**.

HFST and 12TP(hex) signal decoupler

The **12TP_{hex}** version of this plug (typically bundled with **BA3**) provides signal output for a Hexanode only: it has to be completed by a set of **HFSD** and **HFST**: **FT4TP** plus **FT12TP_{hex}** forms the **FT16TP** product assembly, which is used for readout of **HEX** detectors.

All signal decouplers are passive units and do not require external operating voltages (the SHV inputs serve only for the detector bias). Decoupling plugs and feedthroughs are specified up to 4 kV (**FT4TP_{shv}** up to 5 kV) DC input (or higher*).

Although armed with discharge protection chips the internal circuits may be damaged by unsafe detector operation conditions or operational failures. Likewise, electronic units connected to the **FT4/12/16TP** can be damaged in this way.



Mounting of FT12TP, here: Hex version on DN200CF-DN40CF² (CF200-CF35², ICF253-ICF70²) detector mounting flange.

The size of the **HFSD** and **HSFT** case is 21 x 47 x 65 mm³, prolonged by the MHV/SHV sockets so that the full height of a connected **HFSD/T** over the DN40CF flange face is 115 mm for MHV and 106mm for SHV feedthroughs (+13 mm to the mounting flange face). Extra space must be provided for connecting an SHV cable to the socket. The latter is also to be considered for the **12TP(hex)**.

* Special versions of the **12TP(hex)** plugs serve as signal transforming units for **XHV** signal decoupling devices.

Specification sheet for **RoentDek** FT12TP and FT16TP (-203 and -253)

General description

The **RoentDek** FT12TP decoupler is available in two versions: the regular FT12TP is used to connect the high voltages needed by **RoentDek** DLD detectors to the in-vacuum detector via a 12-pin feedthrough. Also the signals from the detector (MCP front, MCP back, anode signals x1, x2, y1 and y2) are decoupled and provided on Lemo 00 socket outputs for further processing.

The FT12TP-hex version is used for **RoentDek** Hex detectors. The FT12TPhex provides the anode signal outputs x1, x2, y1, y2, z1 and z2. The MCP and Holder voltages must be routed through an additional 4-fold MHV or SHV feedthrough (FT4TP) onto which the RoentDek HFSD or HFST decouplers must be installed. The combination of FT4TP and FT12TPhex is called FT16TP.

Ratings

Signal output bandwidth:	about 500 MHz
Maximum operating voltage:	4 kV
Input impedance:	150 Ohms for anode signals 50 – 150 Ohms for MCP signals (adjustable via pots)
Output impedance:	50 Ohms (on Lemo 00 sockets)
Protection circuit (MCP):	A three-stage protection circuit protects the connected amplifiers from damage by high voltage sparks (cut-off voltage approx. 0.7 Volts, maximum impulse current 10.000 A).
Protection circuit (Anode):	Voltage between Sig and Ref anode wires will be limited to about 150 Volts in order to prevent welding of anode wires in case of sparks
In-vacuum-cables:	Dielectric strength is about 2 kV – the cables must not touch any part on ground potential (For optimal signal quality the cables should not touch anything at all) Impedance of twisted-pair cables for anode signals is approx. 110 Ohms.
Flange options:	Mounting flange is available as: - DN160CF (FT12TP-203 resp.FT16TP-203) - DN100CF (FT12TP-253 resp.FT16TP-253) Larger flange sizes on request.