1. GENERALITY.

“PETROL” PD flowmeters may be equipped with pulse transmitters either for remote totalization of volumes flown either to have available, normally in control room, an analog signal proportional to the flow-rate (4 - 20 mA or alternatively 0 - 20 mA) for flow regulation and/or recording.

Pulse transmitters normally used are of inductive type with intrinsecally safe signal transmission, but underdetailed types may be alternatively supplied:

- micro-switch type, weather proof version;
- micro-switch type, explosion proof version;
- photo-electric type, explosion proof version;

This document deals only with inductive type pulse transmitters.

2. INDUCTIVE TYPE PULSE TRANSmitters.

This type of transmitter is used either for remote totalization (transmission of pulses scaled at 1 pulse/volumetric unit flown) either for frequency transmission (pulses to be converted into an analog signal 4 - 20 mA or alternatively 0 - 20 mA).

Transmitter is mainly composed by a "fork" type inductive pick-up, integrally mounted with the "reduction gear assembly" housed inside the counter base of PD flowmeter.

The pick-up normally used is mod. AF 3,5, the technical and dimensional characteristics of which are detailed on the attached table 1.

The pick-up operates by means of a "vetronite" disk on which several copper sectors are present.

A current change is generated when such sectors pass between the pick-up polarities.
The number of sectors may be different, in accordance to specified installation needs. The "vetronite" disk is normally keyed on:

- "reduction gear assembly" input shaft, for frequency transmission (pulse to be converted into an analog signal 4 - 20 mA or alternatively 0 - 20 mA);
- "reduction gear assembly" output shaft, for remote totalization (transmission of pulses scaled at 1 pulse/volumetric unit flown).

On the same "reduction gear assembly", i.e. on the same PD flowmeter, both transmitters may be contemporarily mounted.

The inductive type pick-up, as supplied, is completed with two (2) conductors, the positive one of which is shielded with a red sheath while the negative one is shielded with a black sheath.

The two (2) conductors are wired on a terminal board housed inside the explosion-proof housing integrally mounted with the counter base.

Either the pick-up/"vetronite" disk mounting system either the conductors terminal board are shown in the underdetailed sectional drawings, which is completed with "legenda" for the parts identification.

- drawing GAC/01/E, pulse transmitter for remote totalization;
- drawing GAF/01/E, pulse transmitter for frequency transmission;
- drawing GACF/01/E, pulse transmitter for both remote totalization and frequency transmission.

---

Aprilia, 07/01.

ATT.
- table 1,
- dis. GAC/01/E,
- dis. GAF/01/E,
- dis. GACF/01/E.
TABLE 1

"FORK" TYPE INDUCTIVE PICK-UP, MOD. AF 3,5

1. OUTLINE DIMENSIONS

![Diagram of outline dimensions]

2. TECHNICAL CHARACTERISTICS

- Air gap 3,5 mm
- Max. frequency 5 KHz.
- Accuracy 0,01 mm
- Repeatability 0,01 mm

- Supply voltage 8 V DC ± 20%
- Harmonic content < 5%
- Switching range change in current
- Metal absent < 3 mA
- Metal present < 1 mA

- Type of protection IP 66
- Conductors length 0,5 m
1. GENERALITY

Electric pulses transmitted from PD flowmeters may be used for:

1.1. totalization of volumes flown, on electro-mechanic type counters;
1.2. conversion into an analog signal 4 - 20 mA or alternatively 0 - 20 mA proportional to actual flow-rate.

In accordance to our doc. TR/IN/01/E PD flowmeters of our own contruction are normally equipped with inductive type pulse transmitters.
Therefore this document deals only with totalization/conversion sistems suitable for connection to such type of transmitters.

2. TOTALIZATION

For remote totalization an intrinsecally safe amplifier, Cenelec EN50.014/EN50.020 certified, which is normally installed in control room and/or in a "safe area", is used.

The amplifier provides for the inductive type pick-up supply and has available a relais output (mod. EXI-NR) or, alternatively, a transistor output (mod. EXI-NS) mainly for connection to computerized processors.

The amplifier must be powered by the electrical supply available (110 V. AC, 220 V. AC, 24 V. DC or others), which, in any case, is specified in the estimate and must be confirmed in the eventual order.
The specific/general characteristics of amplifiers are shown on the attached table 1, while the out-line dimensions are detailed in the attached drawing EXCF-001.

For the totalization of volumes flown in volumetric units such as liters, dekalitres etc, it is necessary that:

2.1. the amplifier is connected to pick-up/"vetronite" disk keyed on the "reduction gear assembly" output shaft.
   As a matter of fact this shaft directly moves the PD flowmeter counter, the volumetric reading unit of which is specified in the estimate.

2.2. the amplifier output is connected with an electro-mechanic type counter, normally supplied by others, for visualization of volumes flown.
   The pulses scaling in volumetric units such as 1 pulse/liter or 1 pulse/dekalitre etc., i.e. the volumetric unit of electro-mechanic totalizer is specified in the estimate.

The inductive pick-up/amplifier/electro-mechanic totalizer wiring scheme is shown in the attached drawing n. M-R/C 208/I.

3. CONVERSION INTO ANALOG SIGNAL

For pulses remote conversion into an analog signal, the frequency to current converter mod. CFC-1, normally installed in control-room, is used.

The converter provides for the inductive type pick-up supply and gives out an analog signal 4 - 20 mA or alternatively 0 - 20 mA proportional to actual flow rate.

The converter must be powered by the electrical supply available (110 V. AC, 220 V. AC, 24 V. DC or others), which, in any case, is specified in the estimate and must be confirmed in the eventual order.

Electrical characteristics of mod. CFC-1 converters are shown on attached table 2, while the out-line dimensions are detailed in the attached drawing n. M-R/D 003/I.

In order to obtain better performances from the frequency to current converter, it is normally recommended that its input frequency is not too low.
It is therefore a need that the converter is connected to pick-up/"vetronite" disk system keyed on "reduction gear assembly" input shaft.

As a matter of fact this shaft is the first available down stream of the PD flowmeter movement transmission system and therefore it shows the higher angular velocity available.

The inductive pick-up/mod. CFC-1 converter wiring scheme is shown on the attached drawing n. M-R/C 004/I.

IMPORTANT: In case for remote conversion into an analog signal, an intrinsically safe pulse transmission system is required, it is enough to install, just upstream the mod. CFC-1 frequency to current converter, a mod. EXI-NS amplifier, the characteristics of which are detailed under above item 1 dealing with totalization.

In such case the pick-up/amplifier/converter wiring scheme is shown on attached drawing n. M-R/C 003/I.

4. TOTALIZATION AND CONVERSION INTO ANALOG SIGNAL

To have available both the remote totalization and the remote conversion into an analog signal two (2) inductive pick-up/"vetronite" disk systems are used, the first one of which keyed on the "reduction gear ass'y" output shaft and the second one keyed on the "reduction gear ass'y" input shaft of the same PD flowmeter.

As far as amplifiers and converters are concerned please refer to above items 1 and 2, respectively dealing with totalization and conversion.

The inductive pick-up/amplifier and inductive pick-up/amplifier/converter wiring scheme is shown on attached drawing n. M-R/C 308/I.

Aprilia, 07/01.
TABLE 1

INTRINSECALLY SAFE AMPLIFIERS MOD. EXI-NR

1. SPECIFIC TECHNICAL CHARACTERISTIC

1.1. PROTECTION
(EEX-ia) II C T6

1.2. CERTIFICATION
CENELEC EN 50.014 / EN50.020

1.3. ELECTRICAL SUPPLY
220V.a.c., standard;
alternatively:110V.a.c.24V.d.c.

1.4. INPUT CIRCUIT

<table>
<thead>
<tr>
<th>Voltage (V) max</th>
<th>8.6 V d.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current (I) max</td>
<td>11 mA</td>
</tr>
</tbody>
</table>

NOTE: Recommended section for each interconnecting conductor is 1 mm$^2$

1.5. OUTPUT CIRCUIT (RELAIS)

<table>
<thead>
<tr>
<th>Contact Type</th>
<th>n. 2 NO, standard;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>alternatively:</td>
</tr>
<tr>
<td></td>
<td>• n. 1 SPDT</td>
</tr>
<tr>
<td></td>
<td>• n. 2 NC,</td>
</tr>
<tr>
<td></td>
<td>• n. 1 NO + n. 1 NC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contacts max. voltage</th>
<th>250V. d.c.; 250V. a.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacts max. current</td>
<td>0.2 A (d.c.) 4 A (a.c.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max frequency</th>
<th>10 Hz.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Contact Material</th>
<th>AgCdO</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Mechanic Life</th>
<th>$10^6$ operations</th>
</tr>
</thead>
</table>
TABLE 1 A

INTRINSICALLY SAFE AMPLIFIERS MOD. EXI-NS

1. SPECIFIC TECHNICAL CHARACTERISTIC

1.1. PROTECTION  (EEX-ia) II C T6

1.2. CERTIFICATION  CENELEC EN 50.014 / EN50.020

1.3. ELECTRICAL SUPPLY  220V.a.c., standard;
                           alternatively:110V.a.c.24V.d.c.

1.4. INPUT CIRCUIT
     voltage (V) max  8,6 V d.c.
     current (I) max  11 mA

NOTE: Recommended section for each interconnecting conductor is 1 mm²

1.5. OUTPUT CIRCUIT

max. supply  30 V. d.c.
max. current  100 mA
max frequency  2 KHz.

-------- o o o o------

Aprilia, 07/01.
FOLLOW TABLE 1

2. GENERAL CHARACTERISTICS

2.1. ELECTRICAL

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>supply variation</td>
<td>+/- 10%</td>
</tr>
<tr>
<td>frequency</td>
<td>50 Hz.</td>
</tr>
<tr>
<td>consumption</td>
<td>1.5 VA</td>
</tr>
</tbody>
</table>

2.2. AMBIENT

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ambient temperature</td>
<td>-20°C. / +55°C.</td>
</tr>
<tr>
<td>storage temperature</td>
<td>-40°C. / +85°C.</td>
</tr>
<tr>
<td>max relative humidity</td>
<td>95%</td>
</tr>
<tr>
<td>vibrations</td>
<td>4g on all the directions</td>
</tr>
</tbody>
</table>

2.3. OPERATING

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>working position</td>
<td>any position</td>
</tr>
<tr>
<td>maintenance</td>
<td>not necessary</td>
</tr>
</tbody>
</table>

2.4. HOUSING

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>termoplastic autoextinguishing, not dripping;</td>
<td>termoplastic autoextinguishing, not dripping;</td>
</tr>
<tr>
<td>quick mounting</td>
<td>DIN 46277 section;</td>
</tr>
<tr>
<td>waall, with bracket</td>
<td>waall, with bracket</td>
</tr>
<tr>
<td>center line</td>
<td>DIN 43604</td>
</tr>
<tr>
<td>protection</td>
<td>housing IP 50, terminal IP 10</td>
</tr>
<tr>
<td>weight approximate</td>
<td>250 g.</td>
</tr>
</tbody>
</table>

Aprilia, 07/01.
# TABLE 2

FREQUENCY TO CURRENT CONVERTERS MOD. CFC-1

1. SPECIFIC TECHNICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td><strong>1.1 SUPPLY</strong></td>
<td>220V.a.c., standard; alternatively: 110V.a.c. 24V.c.c.</td>
</tr>
<tr>
<td><strong>1.2 INPUT CIRCUIT</strong></td>
<td>intrinsically safe</td>
</tr>
<tr>
<td>voltage max.</td>
<td>8 V.</td>
</tr>
<tr>
<td>current max.</td>
<td>8 mA</td>
</tr>
<tr>
<td>resistance max.</td>
<td>&lt; 100 Ohm</td>
</tr>
<tr>
<td>full scale minimum</td>
<td>1 Hz</td>
</tr>
</tbody>
</table>

**NOTE:** Recommended section for each interconnecting conductors is 1 mm²

<table>
<thead>
<tr>
<th><strong>1.3 OUTPUT CIRCUIT</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>current</td>
<td>4 - 20 mA standard, alternatively: 0 - 20 mA</td>
</tr>
<tr>
<td>load max.</td>
<td>500 Ohm</td>
</tr>
</tbody>
</table>

| **1.4 ACCURACY** | +/- 1% within 1:10 range |
| **1.5 LINEARITY** | +/- 1% within 1:10 range |
2. GENERAL CHARACTERISTICS

2.1 ELECTRICAL

- supply variation: +/- 10%
- frequency: 50 Hz.
- consumption: 1.5 VA

2.2 AMBIENT

- ambient temperature: -20 °C / + 55 °C
- storage temperature: -40 °C / + 85 °C
- max. relative humidity: 95%
- vibrations: 4g on all the directions

2.3 OPERATING

- working position: any position
- maintenance: not necessary

2.4 HOUSING

- quick mounting: termoplastic autoextinguishing, not dripping;
- DIN 46277 section;
- wall, with bracket
- DIN 43604
- bracket hole: DIN 43604
- center line
- protection: housing IP 50, terminal IP 10
- weight approximate: 250 g.
Precauzioni per l'installazione e l'esercizio delle barriere attive EXI e dei convertitori frequenza/corrente CFC-1.

Le barriere ed i convertitori frequenza/corrente devono essere installati in area sicura. Il montaggio in area pericolosa è ammesso soltanto se le apparecchiature sono contenute in una custodia antiodieltrica certificata. L'ambiente in cui le apparecchiature vengono installate deve essere sufficientemente ventilato per evitare che la temperatura superi 55°C.

The following precautions must be observed for the installation and operation of EXI active barriers and CFC-1 F/I converters.

The active barriers must be installed in safe areas. They cannot be installed in hazardous area unless enclosed in a certified explosion proof enclosure. The area where the units are installed must be enough ventilated in order to avoid that their temperature exceeds 55°C.
NOTE
Black terminal and white terminal are connected each to its own inductive pickup. Both pick up are coupled with the PD flowmeter reduction gear ass’y.

Inductive pulse transmitter output

Color cables
+ ) Reed or Brown
- ) Black or Blue

FIELD
CONTROL ROOM

EXI-NR

"PETROL" PD FLOWMETERS
MOD. EXI-NR AMPLIFIER

WIRING SCHEME

<table>
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<tbody>
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<td>APP</td>
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<th>1</th>
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<td>Tag</td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Sheet n. 77
NOTE
Black terminal and white terminal are connected each to an own inductive pick up. Both pick up are coupled with the PD flowmeter reduction gear ass'y.

Inductive pulse transmitter output

Black terminal high frequency output

White terminal low frequency output

Color cables
+ ) Reed or Brown
- ) Black or Blue

FIELD

CONTROL ROOM

"PETROL" PD FLOWMETERS

MOD. CFC-1 F/I CONVERTER PLUS MOD. EXI-NR AMPLIFIER

WIRING SCHEME

Customer | Order | Job
---|---|---
| | |

DRN | CKD | APP | Drawing N.
---|---|---|---
| | | |

M-R/C 309/0/1

Revisions | 0 | 1 | 2 | 3 | 4 | Date | Tag | Sheet of
---|---|---|---|---|---|---|---|---
| | | | | | | | |