

PETRODAT 3002

Aircraft Refuelling

Service Manual

SA 980302

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1 Safety instructions

1.1 General safety instructions

The operator of the facility is responsible for observing all the regulations in force for the storage, transportation and loading/unloading of combustible liquids.

Regulations and provisions lose none of their validity when a facility is used with PETRODAT units.

PETRODAT units are built with due consideration to the regulations currently in force and left the factory in perfect condition. Their installation and maintenance are to be entrusted to properly trained specialists only.

- Make sure that the data and operating conditions specified by the manufacturer are observed.
- Follow the instructions for operating and servicing the units.
- If you discover any signs of damage or breakage on any parts of the system or if the system's safe operation cannot be guaranteed for any other reason, do not start the system or, if already in operation, shut down the system immediately.
- Get in touch with our service specialists if you discover any faults or defects during operation or if you have cause to doubt that the units are working properly.
- PETRODAT units are not a replacement for a tanker vehicle's safety equipment or for a user's own safety measures (e. g. overfill cut-out).

Exclusion of liability

BARTEC accepts no liability for any damage resulting from non-observance of the safety regulations or from non-compliance with the operating instructions or operating conditions. This applies similarly to any consequential damage anywhere in the facility.

1.2 Installation instructions

- Install the units in such a way that the stipulated climatic and temperature limits are not exceeded. If necessary, provide protection in the form of covers, heaters or coolers.
- Choose a point of installation that is as free from shocks and vibrations as possible. Use strong brackets to protect all components from vibrations.
- The printer and the SSM cartridge station should be installed where they are permanently protected from dirt and moisture.
- It is imperative to interrupt the power supply to the system (disconnect the power supply) when any welding work is being performed on the vehicle.
- Protect the units from dirt (e. g. metal chips etc.) during installation.
- Use dummy caps to seal off any cable couplings which are not being used.
- Remove the transport brace from the printer before putting it into operation.
- All built-in solenoid valves, relays, etc. have to be interference-suppressed (suppressor diode).

1.3 Wiring instructions

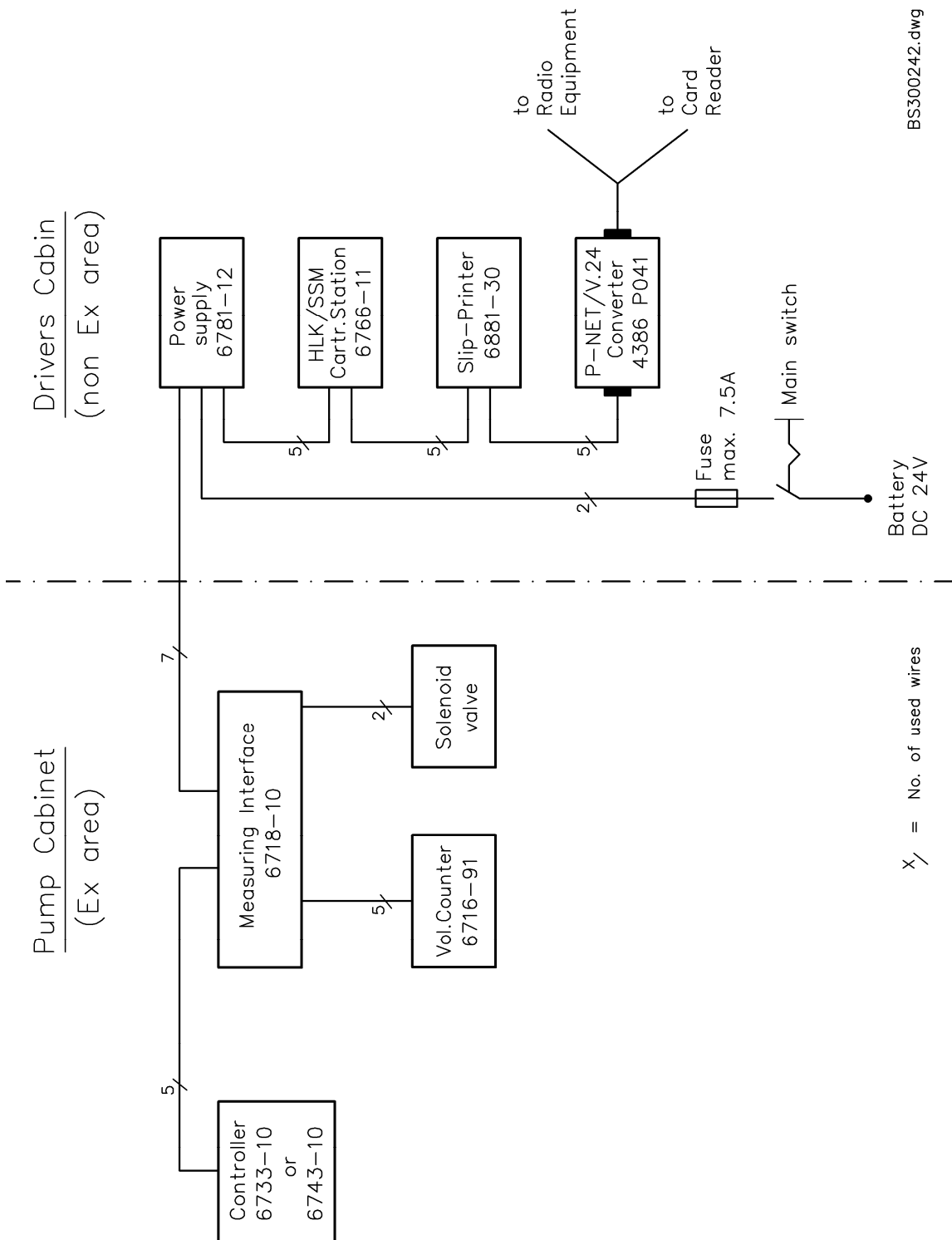
- Have the wiring laid by trained personnel only!
- The installation work has to be performed in accordance with the regulations in force in your country!
- Wire the unit only as shown in the Service Manual!
- When laying the connection cable, make sure there is no sagging in any sections. We recommend fixing the cable with clips or cable ties spaced approx. 15 - 20 cm apart. Particular care is needed when laying the cable in the area of the radiator, in the engine compartment, in the truck frame sections and in the collection cab. There must be no weak points where the cable could be kinked or abraded.
- Fit connector sleeves to the cable ends for securing to the terminals.
- Unused terminal screws should be tightened.

1.4 Maintenance/Repair

- Have maintenance work and repairs performed by trained personnel only!
- Switch off the unit before performing any maintenance work or repairs!

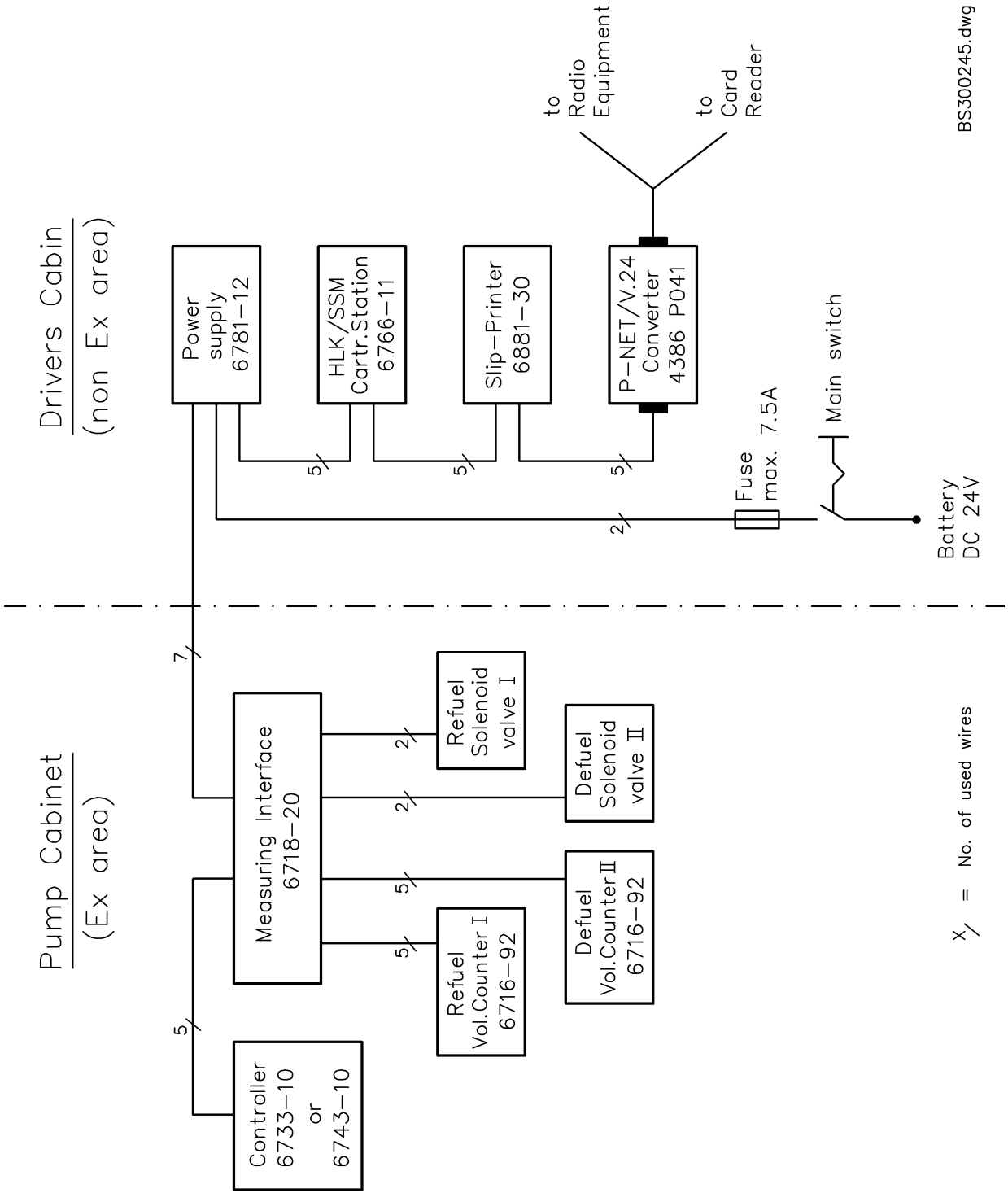
2 Block diagrams of Aircraft Refuelling Trucks

System example 1 - Dispenser Vehicle



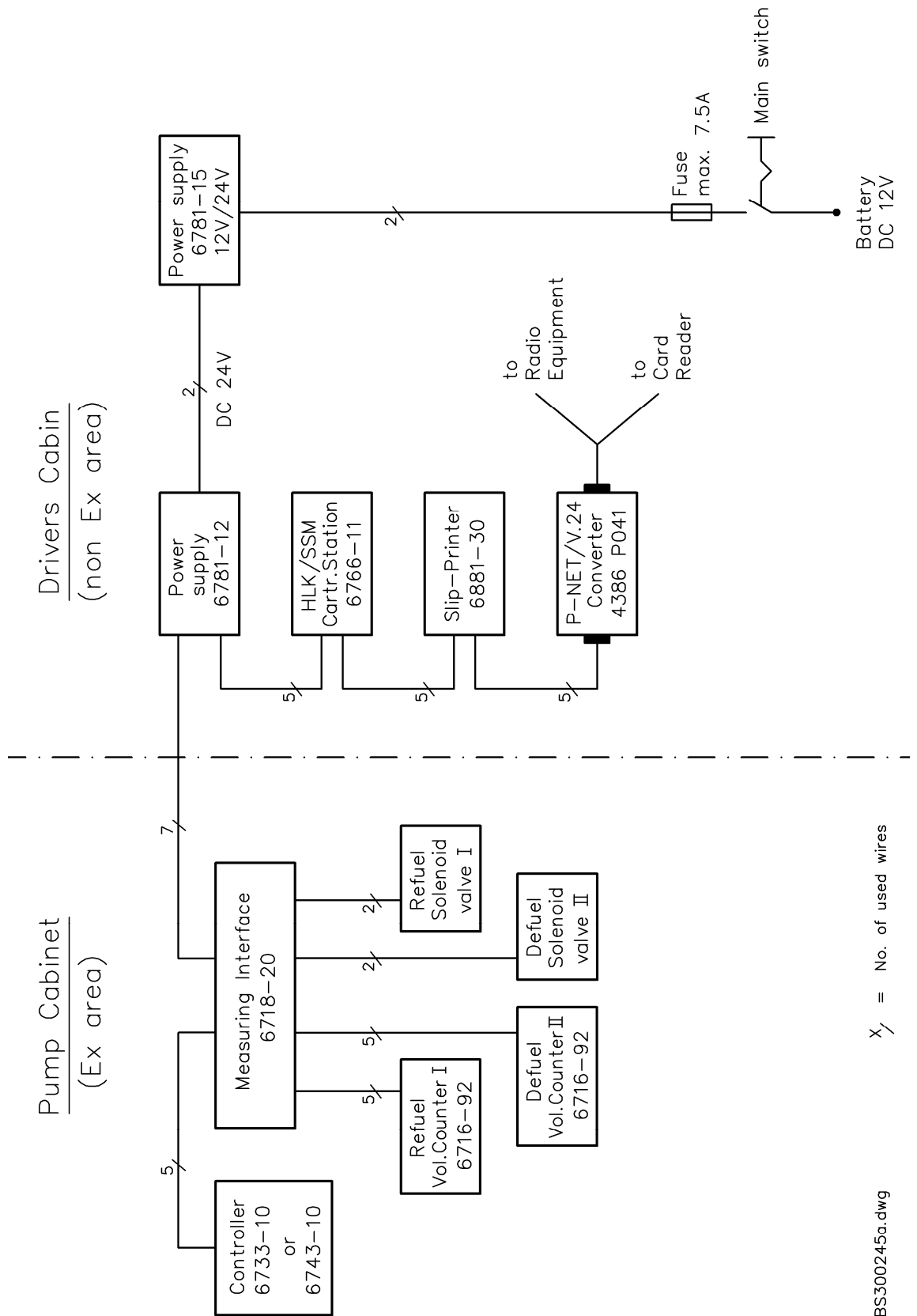
BS300242.dwg

System example 2 - Aircraft Refueller



BS300245.dwg

System example 2 - Aircraft Refueller with 12 V battery voltage



3 Assembly and Installation

3.1 P-NET field bus cable

All the system components used (e.g. the controller, the power supply, etc.) have a P-NET field bus interface and are interconnected by a 7-core P-NET cable. Five of these cores are used for the P-NET connection and 2 are stand-by cores for auxiliary functions. The 2 stand-by cores can be used e.g. for supplying 24 V on-board voltage to the solenoid valves (see the chapter "Output interface"). The cores have to be fitted with cable ferrules.

Technical data

Core design	In accordance with Style No. 1061 and VDE 0881, copper wire 7 x 0,32 mm, Ø tinned = 0,56 mm ² , insulated with semi-rigid PVC. Insulation wall thickness 0,25 mm, Ø of insulated core 1,5 mm.
Taping and shielding	The stranded cores are taped with overlapping transparent plastic film and shielded with a dense braid of tinned copper wires, optical covering ≥ 85 %.
Outer sheat	Matt black special PVC, colour RAL 9005. No twist marks. The PVC blend is oil-resistant, petrol-proof, flame-retardant, weather-proof and UV-resistant. The wall thickness of the outer sheath increases gradually with the number of cores from 0,8 mm (2-core) to 1,0 mm (60-core).
Temperature range	Heat-resistant 105 °C according to VDE 0209 (outer sheath), non-freezing - 20 °C for unrolling and laying, - 55 °C for storage and operation.
Electrical properties	Operating voltage: 300 V, test voltage: 1500 V Conductor resistance: (20 °C) 33 Ω/km Insulation resistance: (20 °C) 153 MΩ x km Effective capacitance: One core against the remaining cores, shield earthed approx. 200 pF/m.
Mechanical properties	Single bending: 5 x outer diameter Repeat bending: 20 x outer diameter

Cable assignment (Order no. 660102)

Core colour	Signal
yellow (YE)	A
green (GN)	B
Shield wire	S
red (RD)	+ 24 V
blue (BU)	GND (0 V)
white (WH)	Reserve/+ 24 V for solenoid valves
black (BK)	Reserve/GND for solenoid valves

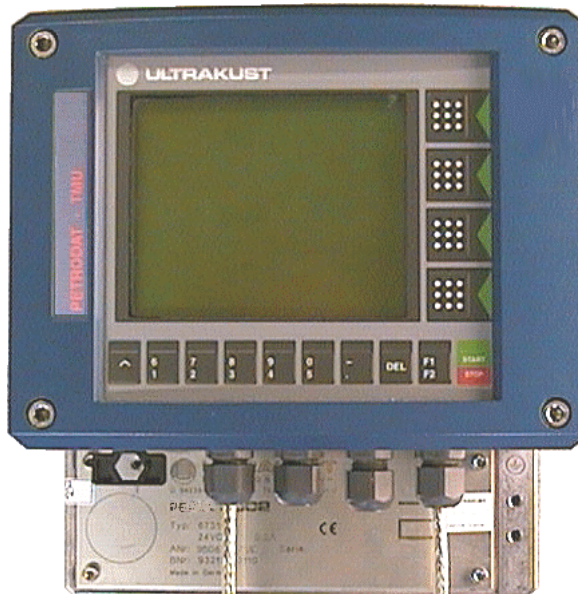
IMPORTANT!

Please note that there is no need for a P-NET ring when wiring system components with the P-NET field bus cable. The components are connected with only a spur line, i.e. a connection from the last unit to the first unit is not required (see Chapter 2, "Block diagrams").

3.2 Controller compact Ex type 6733-10 (A1)

3.2.1 General description

A type 6733-10 compact Ex controller forms the central control and monitoring unit within the PETRO system. Type 6733-10 features electronics of intrinsically safe design combined with terminals of enhanced safety for P-NET and auxiliary voltage to enable its use in Zone 1 hazardous areas. Simple operation, well arranged visual displays and user-friendly window functions are among the unit's notable characteristics.



Features

- A heatable LC display with graphic capabilities and temperature-controlled contrast adjustment unction is used to present all the information.
- The numerical keypad is equipped with twin-function self-illuminating keys. The four additional keys (softkeys) to the right of the display are assigned different meanings by the interactive program according to the situation.
- Information is exchanged with all components of the PETRO system via P-NET (RS 485).
- User programs can be programmed in the high-level language (C++).

- High performance and data security, even during power failures, are assured by a 32-bit processor in conjunction with a battery-backed RAM as data memory.
- The entire software required for the various operations is saved in the flash-EPROM on the CPU board. The memory components do not have to be replaced when the program is changed. The new program is simply written into the flash-EPROM via P-NET (upload).
- EEPROMs, divided between the CPU and the power supply board, are used as parameter memories. The parameter memory on the power supply board holds the system parameters on which the calibration is based.

Design

The electronics consists of a processor board and a power supply board. The keypad and display is a sub-unit which together with the processor board and the front panel forms the easy-to-replace top section of the controller. The power supply board with terminals is located in the cast aluminium base. Two ribbon cables, which can be plugged into the base, connect the top section with the base.

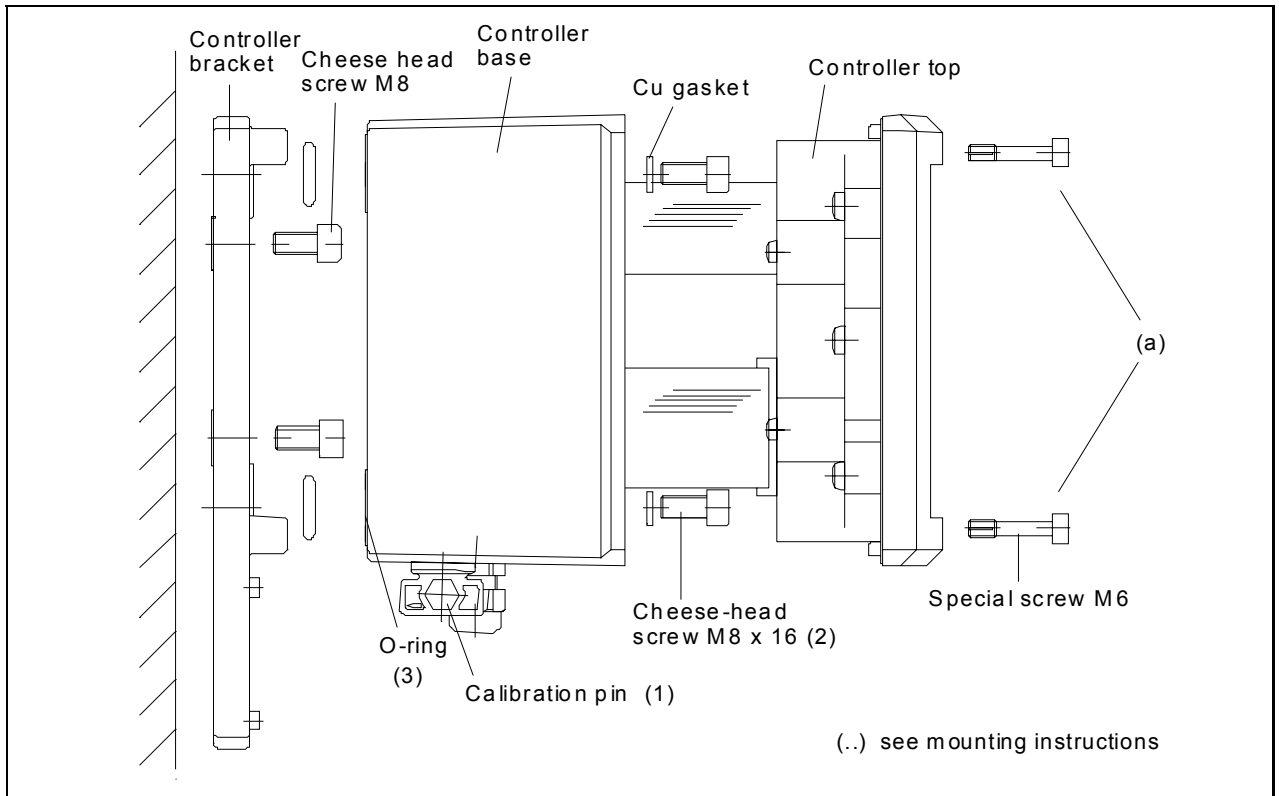
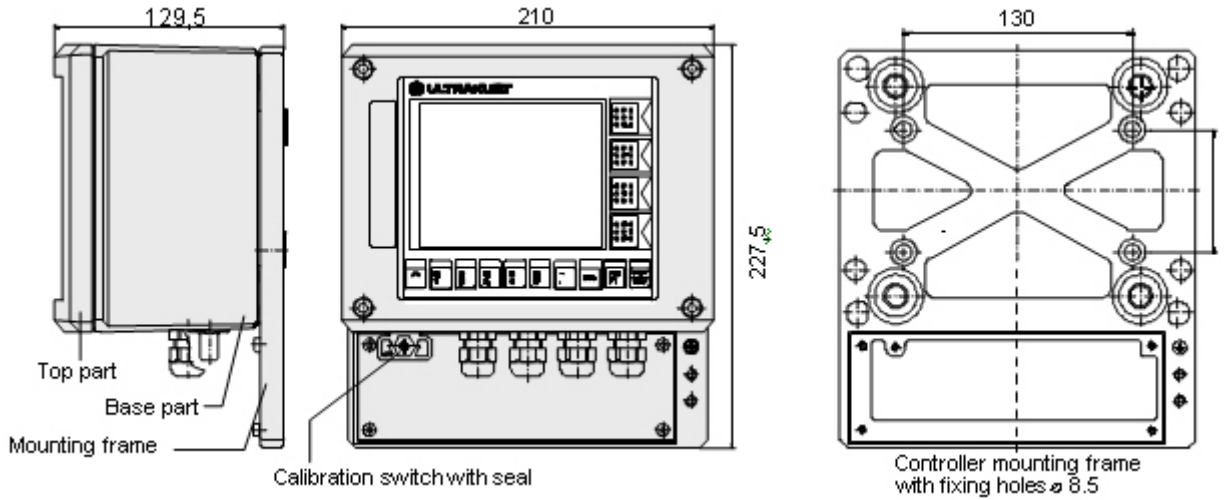
At the back of the controller is a bracket with four holes for mounting purposes. The controller base and its top section are screwed on the bracket.

Calibration parameters are protected by a calibration pin which projects into the controller base and prevents the calibration parameters from being overwritten. At the same time the calibration pin also makes it impossible to remove the EEPROMs or to dismantle the base and the bracket. Only the calibration pin has to be removed in order to re-calibrate the unit, i.e. there is no need to dismantle the controller. Replacing the top of the controller does not affect any data of importance for calibration.

Technical data

Auxiliary energy	Rated voltage: DC 24 V ± 20 %; Rated current: 0,5 A
Electrical connections	Screw terminals of enhanced safety in the controller base, cable routing through 4 x PG9 glands. Interface: 2 x P-NET (RS 485), P-NET I active, with Multimaster capabilities Interface: 1 x RS 232
Keypad	Numerical membrane keypad with dome embossing, 4 extra keys as softkeys
Data processing	32-bit processor 68332 (Motorola), 1 MB flash-EPROM, 512 kB RAM battery-backed, 2 kB EEPROM - in CPU, 2 x 2 kB EEPROM - on power supply board, real-time clock, watchdog
Ambient conditions	Operating temperature: - 20 ...+ 50 °C Storage temperature: - 20 ... + 60 °C Climatic category: JUF, Protection type: IP65
Protection type	EEx em [ib] IIB T4
Display	LC display with graphics capabilities, 160 x 128 pixels
General parameters	Weight: 47 N = 4,7 kg Dimensions: 210 x 227,5 x 129,5 (mm) Case: rugged die-cast aluminium case, powder-coated in blue, bright-finished controller bracket
Mounting	Controller bracket fastened with 4 x M8 screws or by welding

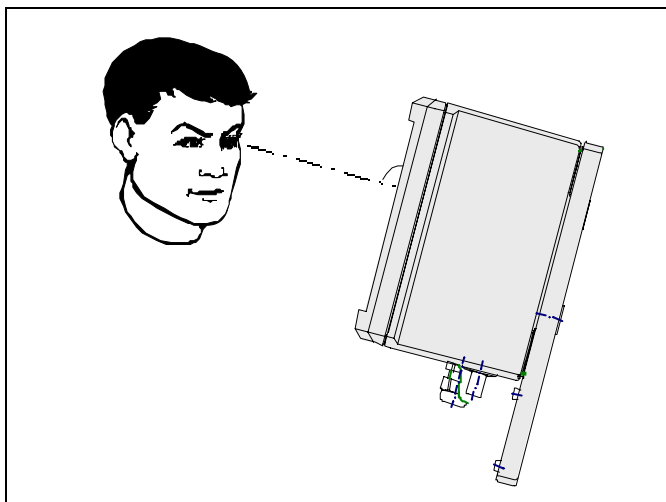
3.2.2 Assembly



Controller assembly instructions

The controller is mounted on the controller bracket with 4 screws (2).

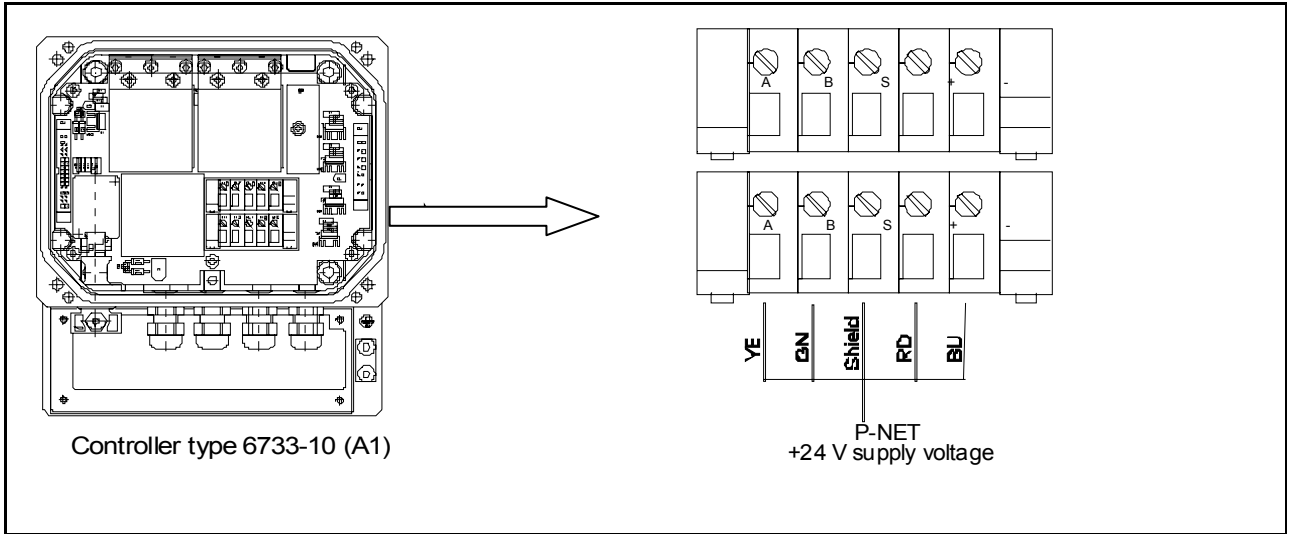
The controller bracket should be fitted to an assembly bracket so that the user's angle of vision is at right angles to the display and reading the display is easy.



Assembly

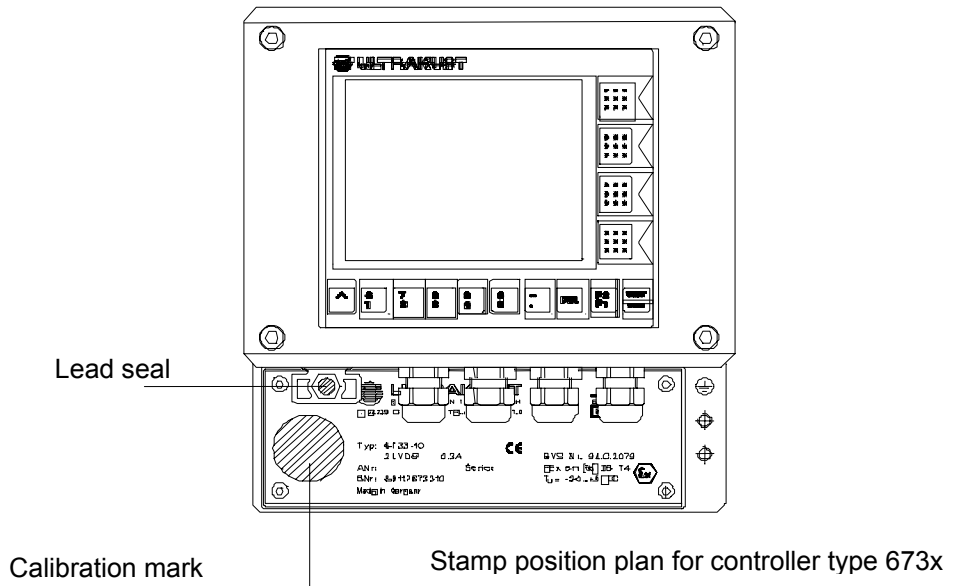
- Undo the 4 screws in the control and display sub-unit, remove the sub-unit and disconnect the two ribbon cables (a).
- Undo the screw in the calibration switch (1) and take out the calibration pin. The calibration switch is located on the outside of the controller underneath on the left-hand side (black rotary switch next to the PG glands).
- Turn the calibration switch through 90° so that you can see the underlying screw (in the controller) (2).
- Undo the 4 screws (2). You can now take the controller base off the controller bracket.
- The controller bracket can now be mounted in the vehicle.
- When the controller bracket is mounted in place, re-insert the 4 O-rings (3) and put the controller base back in place.
- Screw to the controller bracket with the 4 screws (2). Do not forget the copper gaskets!
- Turn the calibration switch and reinsert the calibration pin (after starting up and setting the configuration data).

3.2.3 Wiring



Signal	A	B	S	+	-
Core colour with cable U660 10 2 (new)	YE	GN	Shield	RD	BU

3.2.4 Stamp position plan



3.3 Meter interface Ex

3.3.1 Meter interface Ex type 6718-xx

General description



Application

The meter interface is able to scan up to two temperatures and volumetric flows and to trigger up to four valves simultaneously. The ability to transmit measured values via the serial field bus enables the meter interface to be integrated in a system. The rugged design is suitable for use in stationary and mobile systems in the mineral oil industry.

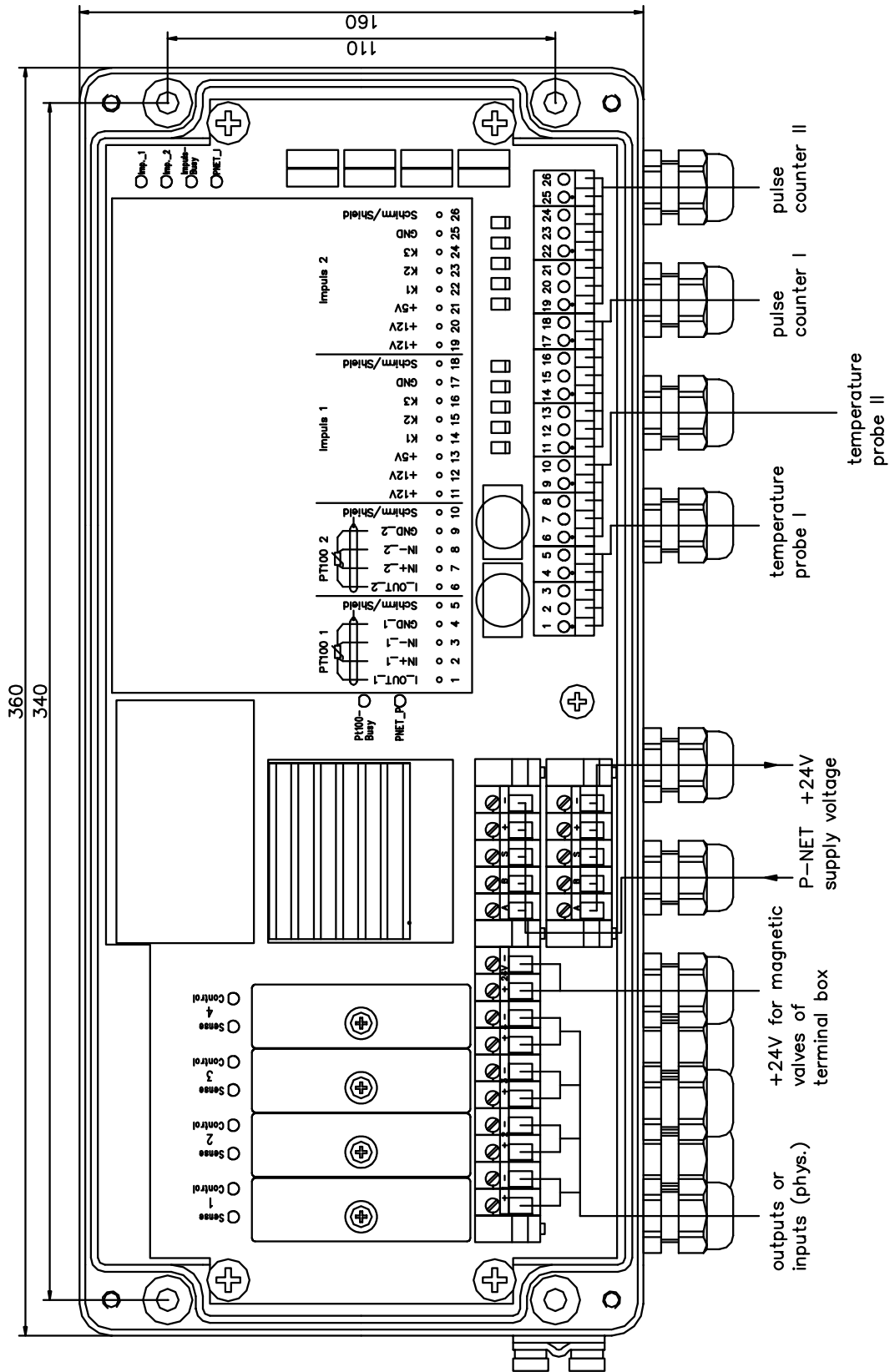
Function

Temperatures are scanned via a Pt100 measuring circuit in accordance with DIN IEC 751. The system identifies sensor fractures as well as sensor short-circuiting. The pulse counter electronics can evaluate 3-phase shaft-encoder. Phase errors etc. are also evaluated by the electronics. The switching outputs are supplied separately, perform various monitoring functions and are protected against overvoltage.

Technical data

Auxiliary energy	Electronics: DC 24 V/0,15 A (16 - 36 V)
Interface	Field bus interface (P-NET), serial, asynchronous Baud rate: 76800 bit/s, lead length: max. 1200 m P-NET-Ident-no.: Pt100-I/O 5925, pulse counter 5926
Ambient conditions	Operating temperature: - 20 ... + 50 °C Storage temperature: - 20 ... + 60 °C Protection type: IP65 according to DIN 40050 Protection type 'e': EEX em [ib] IIB T4, BVS 96.D.2070 Climatic category: JWD according to DIN 40040
Electrical connection	Screw-type terminals 1,5 mm ² , cable routing 7 x or 11 x PG9 Mechanical dimensions: 160 x 360 x 90 mm Housing: die-cast aluminium Weight: 4,5 kg
Temperature measuring circuit	Measurement system Pt 100 according to DIN IEC 751 Measuring range: - 20 ... + 60 °C Resolution 0,1 °C at 10 cycles/sec Measurement accuracy < 0,2 °C in the measuring range Temperature effect < 0,1 °C
Pulse counter interface	Supply 5 V (max. 25 mA), 3-channel design, max. 1 300 pulses/s, input internal 5 kΩ pull-up
Control outputs	Number: 2 or 4 outputs Switching capacity DC 24 V/0.35 A (short-circuit-proof) Switching outputs: dependent on switching elements max. DC 36 V)

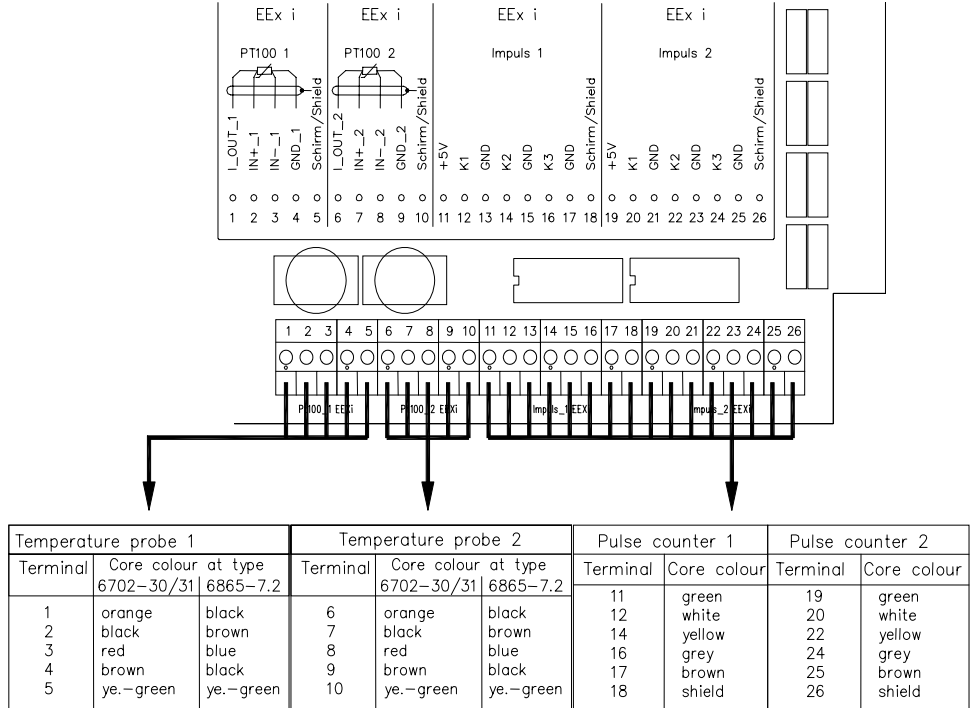
Wiring and Assembly



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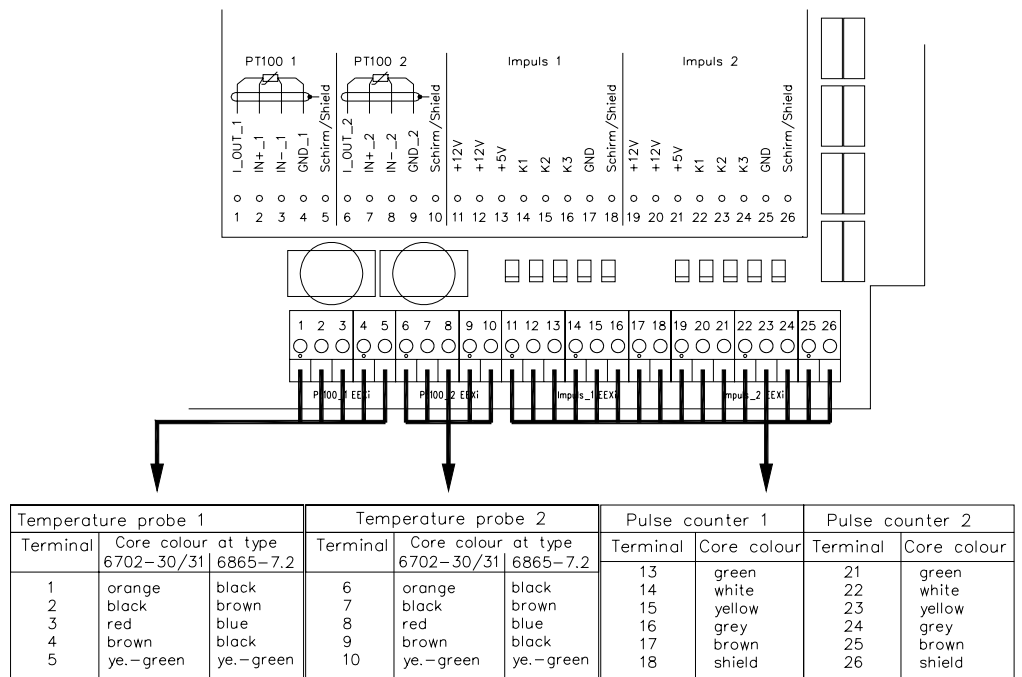
3-channel pulse counter, make „BARTEC“

Wiring for types 6718-10/20 (Ex) and 6717-10/20 (A3) for devices without serial number and for series A



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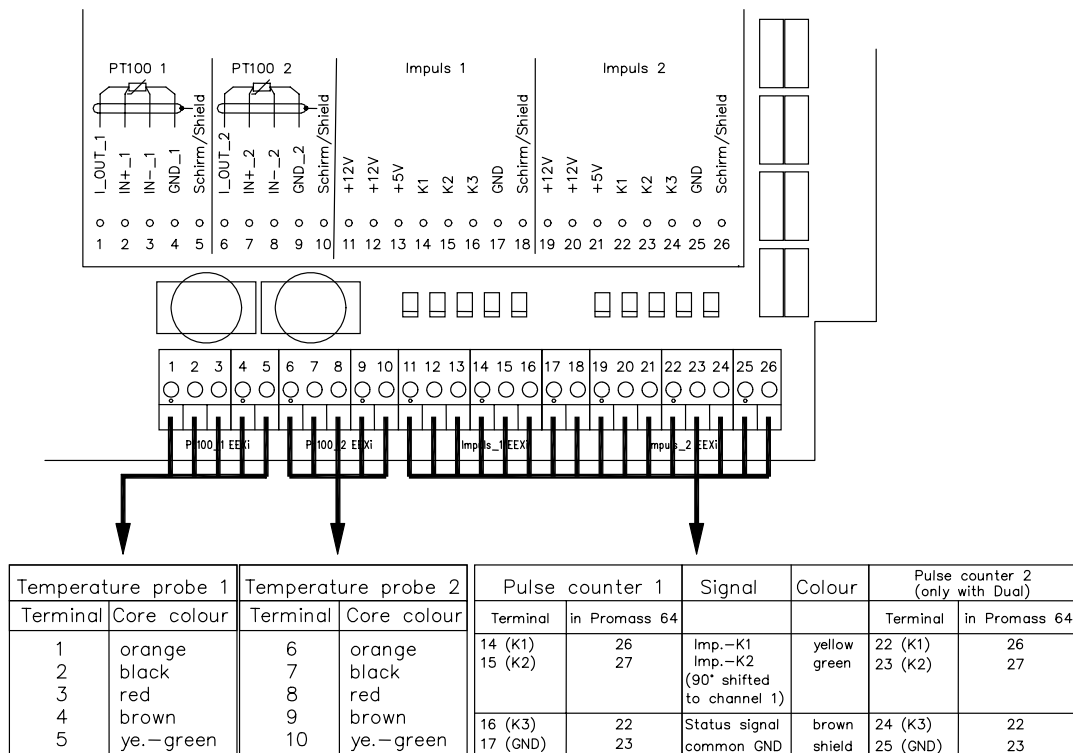
Wiring for types 6718-10/20 (Ex) and 6717-10/20 (A3) for series B



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(6)

2-channel pulse counter with status symbol, type Endress + Hauser, Promass 64 (Ex-e)

Wiring for type 6718-20, P 017 for series B



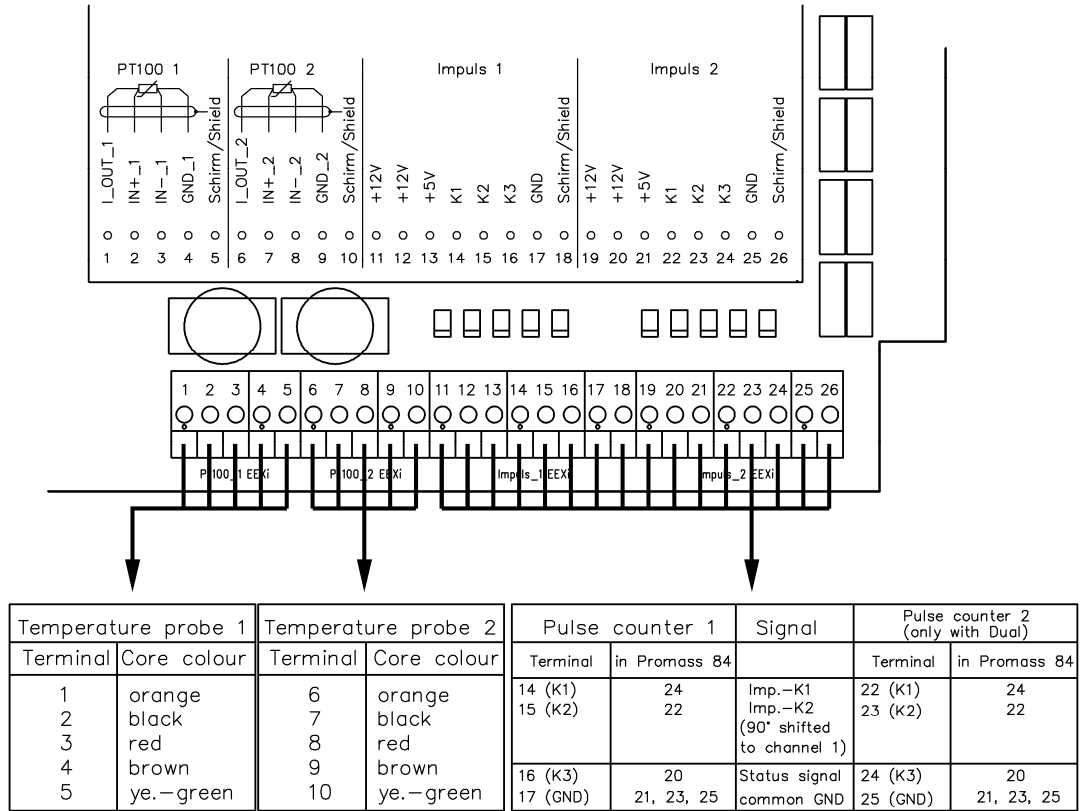
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ATTENTION:

- The measuring interface Promass 64 may only be used and built-in in the A3 section. This is why the Promass 64 is an Ex-e model.
- Only temperature probe Pt 100 Ex-d model allowed.
- Initial configuration of Promass 64: PASSIVE.
- Promass requires an extra voltage of 24 V.
- Promass has to be equipped with the suitable modules.

2-channel pulse counter with status symbol, type Endress + Hauser, Promass 84 (Ex-e)

Wiring for type 6718-20, P 017 for series B



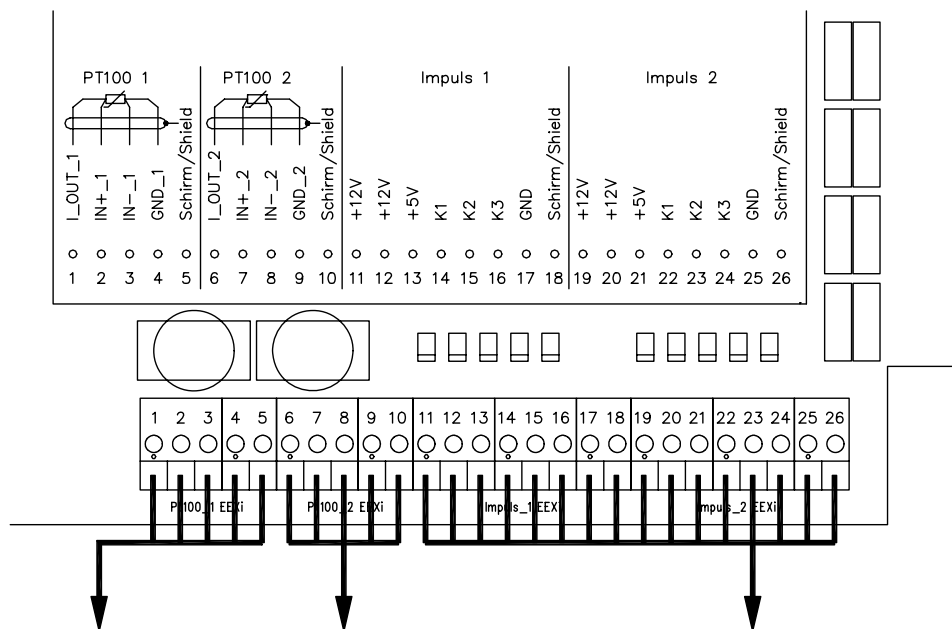
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(4a)

ATTENTION:

- The measuring interface for Promass 84 may only be used and built-in in the A3 section. This is why the Promass 84 is an Ex-e model.
- Only temperature probe Pt 100 Ex-d model allowed.
- Initial configuration of Promass 84: OUTPUTS PASSIVE.
- Promass requires an extra voltage of 24 V.
- Promass has to be equipped with the suitable modules (e.g. 84 F 40 - AD2 SA A 34 A B M 1).

2-channel pulse counter with status symbol, type Faure Herman turbine counter, sensor type FH 71.N (Namur)

Wiring for type 6718-22, P 018 from series B (series 0 and A not possible)

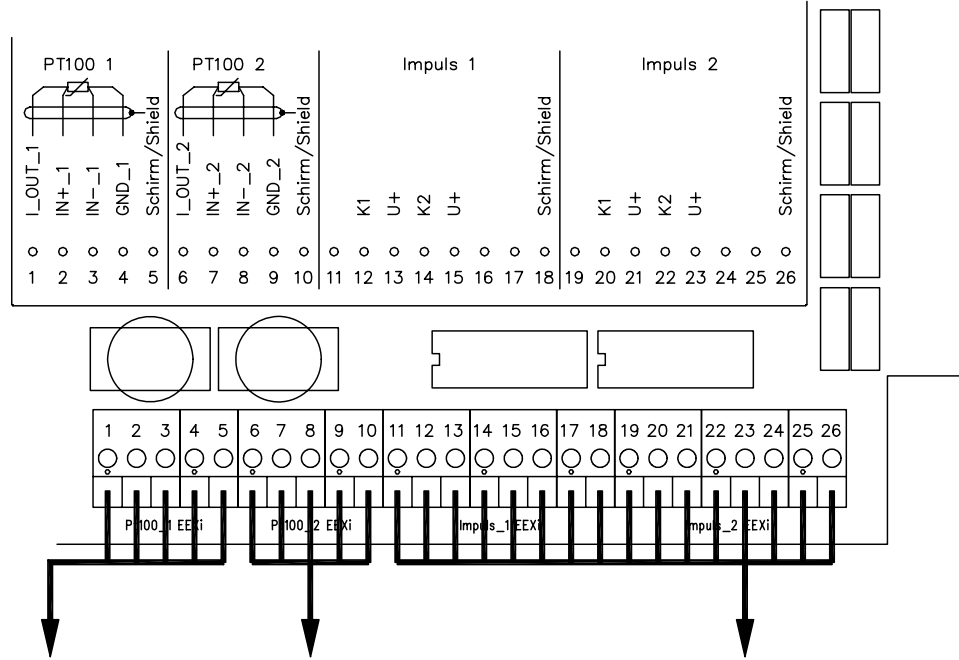


Temperature probe 1		Temperature probe 2		Pulse counter 1		Pulse counter 2	
Terminal	Core colour	Terminal	Core colour	Terminal	Turbine counter sensor 1	Terminal	Turbine counter sensor 1
1	orange	6	orange	11 (+12V)	2	19 (+12V)	2
2	black	7	black	14 (K1)	1	22 (K1)	1
3	red	8	red	Terminal Turbine counter sensor 2 (90° vers.)		Terminal Turbine counter sensor 2 (90° vers.)	
4	brown	9	brown	12 (+12V)	2	20 (+12V)	2
5	ye.-green	10	ye.-green	15 (2k)	1	23 (2k)	1

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(3)

2-channel pulse counter type Sening THS-JSG2AL

Wiring for types 6718-12/-22 (Ex) and 6717-12/-22 (A3) without A-no. or A-no. lower then 9911xxxx)



Temperature probe 1		Temperature probe 2		Pulse counter 1		Pulse counter 2	
Terminal	Core colour	Terminal	Core colour	Terminal	Core colour	Terminal	Core colour
1	orange	6	orange	12 (K1)	white	20 (K1)	white
2	black	7	black	13 (U+)	brown	21 (U+)	brown
3	red	8	red	14 (K2)	white	22 (K2)	white
4	brown	9	brown	15 (U+)	brown	23 (U+)	brown
5	ye.-green	10	ye.-green				

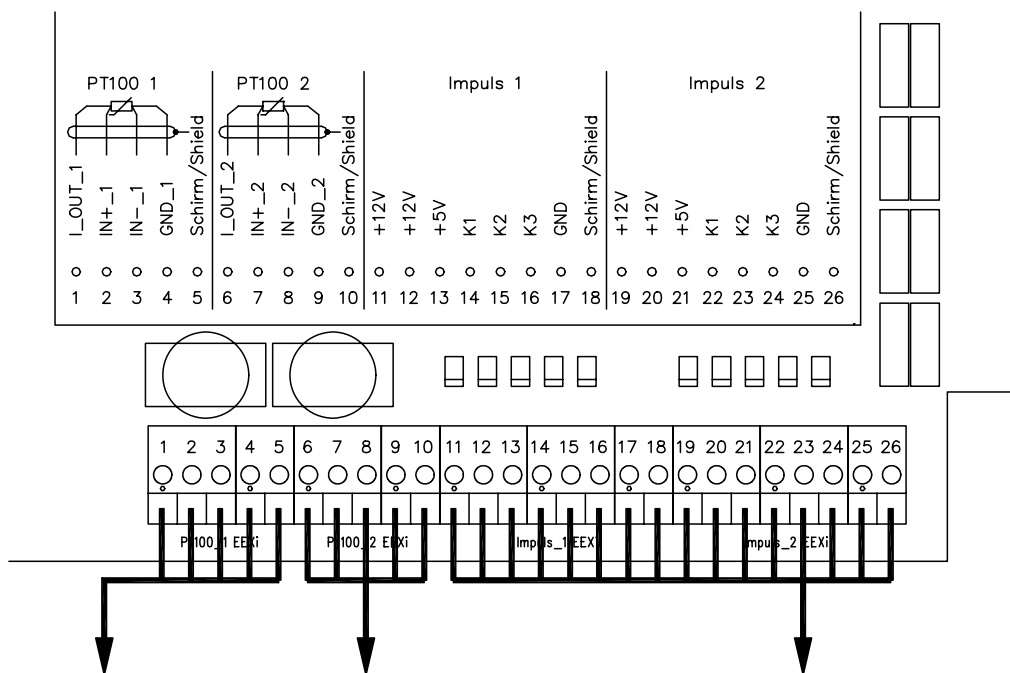
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(1)

ATTENTION (only for series A or without series no.):

- The measuring interface type 6718-x2 (Ex) may only be built in zone 2.
- Only for temperature probe type 6702-30 or 6702-31

2-channel pulse counter type Sening THS-JSG2AL

Wiring for types 6718-12 (Ex) and 6717-12/-22 (A3) for series B (beyond A-no. 9911xxxx)

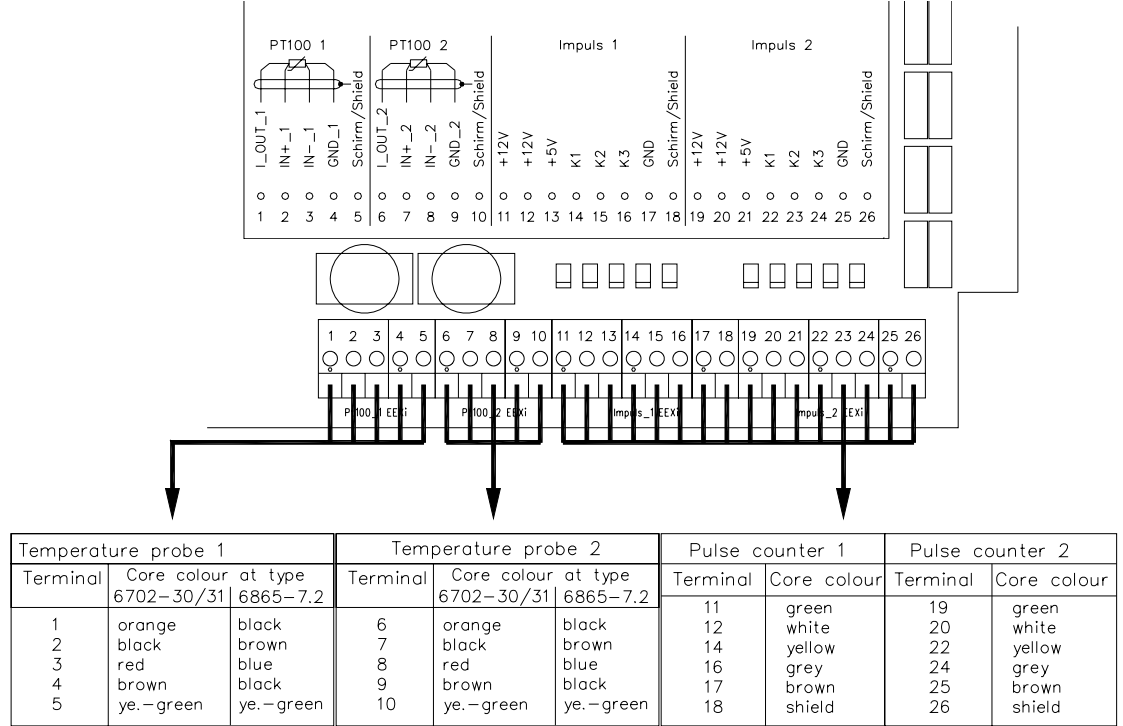


Temperature probe 1		Temperature probe 2		Pulse counter 1		Pulse counter 2	
Terminal	Core colour	Terminal	Core colour	Terminal	Core colour	Terminal	Core colour
1	orange	6	orange	14 (K1)	white	22 (K1)	white
2	black	7	black	11 (+12V)	brown	19 (+12V)	brown
3	red	8	red	15 (K2)	white	23 (K2)	white
4	brown	9	brown	12 (+12V)	brown	20 (+12V)	brown
5	ye.-green	10	ye.-green				

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2-channel pulse counter, type Daniel turbine counter, sensor type PC/N 13-74x (Namur)

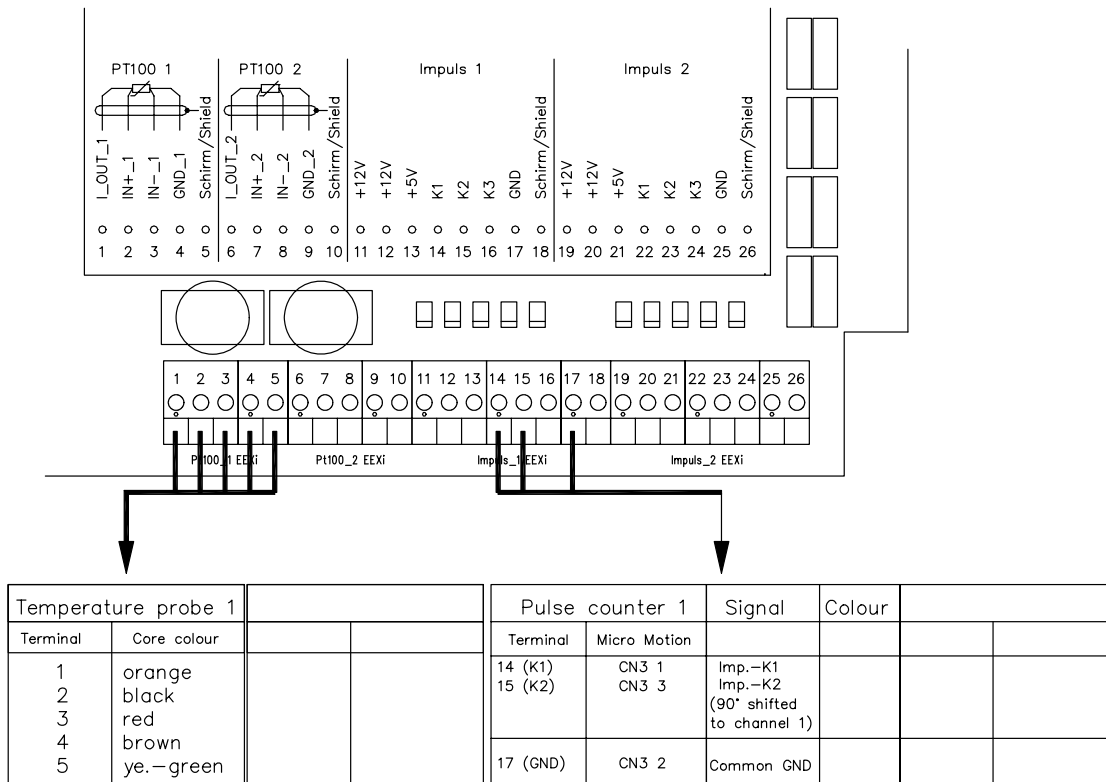
Wiring for type 6718-11, series B



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(6a)

2-channel pulse counter, type mass flow meter Micro Motion RFT 9739 FM transmitter (double pulse output)

Wiring for type 6718-10, P016, for series B



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Assignment of replay outputs in the PETRODAT system:

PETRODAT outputs	logical 3002
enabling meter 1	1
throttling flow meter 1	2
enabling meter 2	5
throttling flow meter 2	6
power off	9
error message to PLC	10
accumulative output of PLC	23

The logical outputs have to be assigned to the various outputs (phys.) in ascending order. Unused outputs are skipped.

e. g. unable meter 1 (logical 1) → is required → assignment output 1
 Throttle 1 (logical 2) → is not required

PETRODAT inputs	logical 3002
ready for fuelling	1
automatic choice of metering point	2

The logical inputs are assigned using the same system as for the outputs. The inputs are allocated to the next free outputs (phys.).

3.3.2 Temperature probe Ex type 6702-30



Application

The temperature sensor has been designed for measurements in zone 0 in tank trucks and in storage facilities for petrochemical fuel. Because of their special steel tip they can also be used in aggressive media, for example in the chemical industry.

Function

A Pt100 measuring element (DIN IEC751, class B) measures the temperature. Since the measuring current, which flows through the sensor, is less than 1 mA, measuring errors which might otherwise result from the sensor's warming up are eliminated.

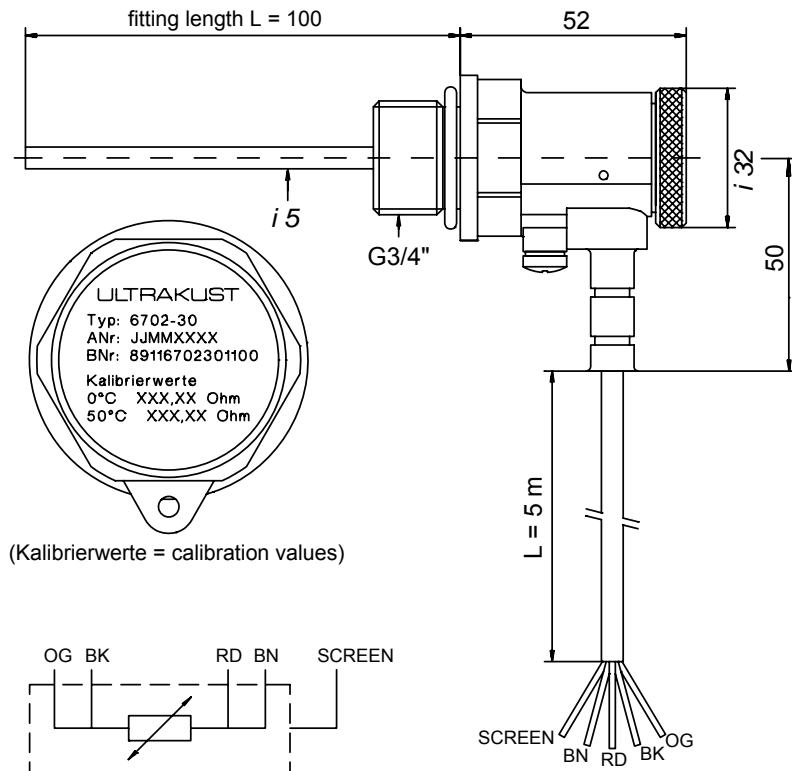
By evaluation of the calibration values indicated on the sensor accuracy better than class A can be reached.

All sensors are equipped with a 5 m cable with open cable ends.

Technical data

Measurement system	Measuring element: Pt 100 according to DIN IEC 751 Class B A level of system accuracy better than Class A is possible by evaluating the calibration values quoted on the sensor Measuring range: - 200 ... + 500 °C Response time: $t_{90} < 5$ sec. Calibration points at 0 °C and 50 °C
Ambient conditions	Connection head: - 40 ... + 60 °C Connection lead: - 30 ... + 60 °C Protection type: IP65 according to EN 60529 Protection type 'e': EEx ib IIC T3 ... T6
Electrical connection	5 m cable, four-core, shielded, with open ends for connection to the evaluation electronics
Assembly/housing	Install with screw-in thread G3/4" Dimensions: \varnothing 38 mm, l = 152 mm, installation position: any Measuring tip: stainless steel, weight: approx. 6 N = 0,6 kg

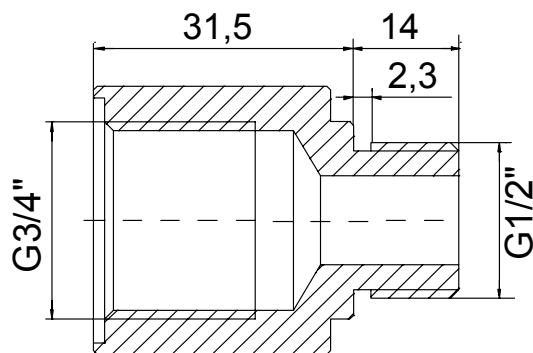
Dimensions



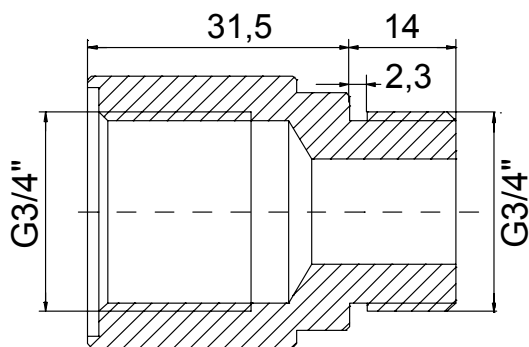
Cable assignment for the measurement system interface

Colour	orange (OG)	black (BK)	red (RD)	brown (BN)	yellow green (YEGN)
Signal	I_OUT_	N+	N-	GND	shield
Terminals for temperature probe I	1	2	3	4	5
Terminals for temperature probe II	6	7	8	9	10

Accessories



Adapter type WT885, order no. 05006340



Adapter type WT891, order no. 05006528

3.3.3 Temperature probe Ex type 6702-31



Application

This temperature sensor is suitable for measurements in zone 0 in tank trucks and in depots of the mineral oil economy. Its design with a stainless-steel test probe makes possible not only measurements in the mineral oil sector but also temperature measurements in aggressive mediums in the chemical industry.

Function

The temperature is measured by a Pt100 measuring element in accordance with DIN IEC 751 class B. The measuring current flowing through the measuring element is less than 1 mA, thus an adulteration of the measured values caused by self-heating is excluded.

By means of the evaluation of the calibration values specified on the sensor, a system precision better than class A can be obtained.

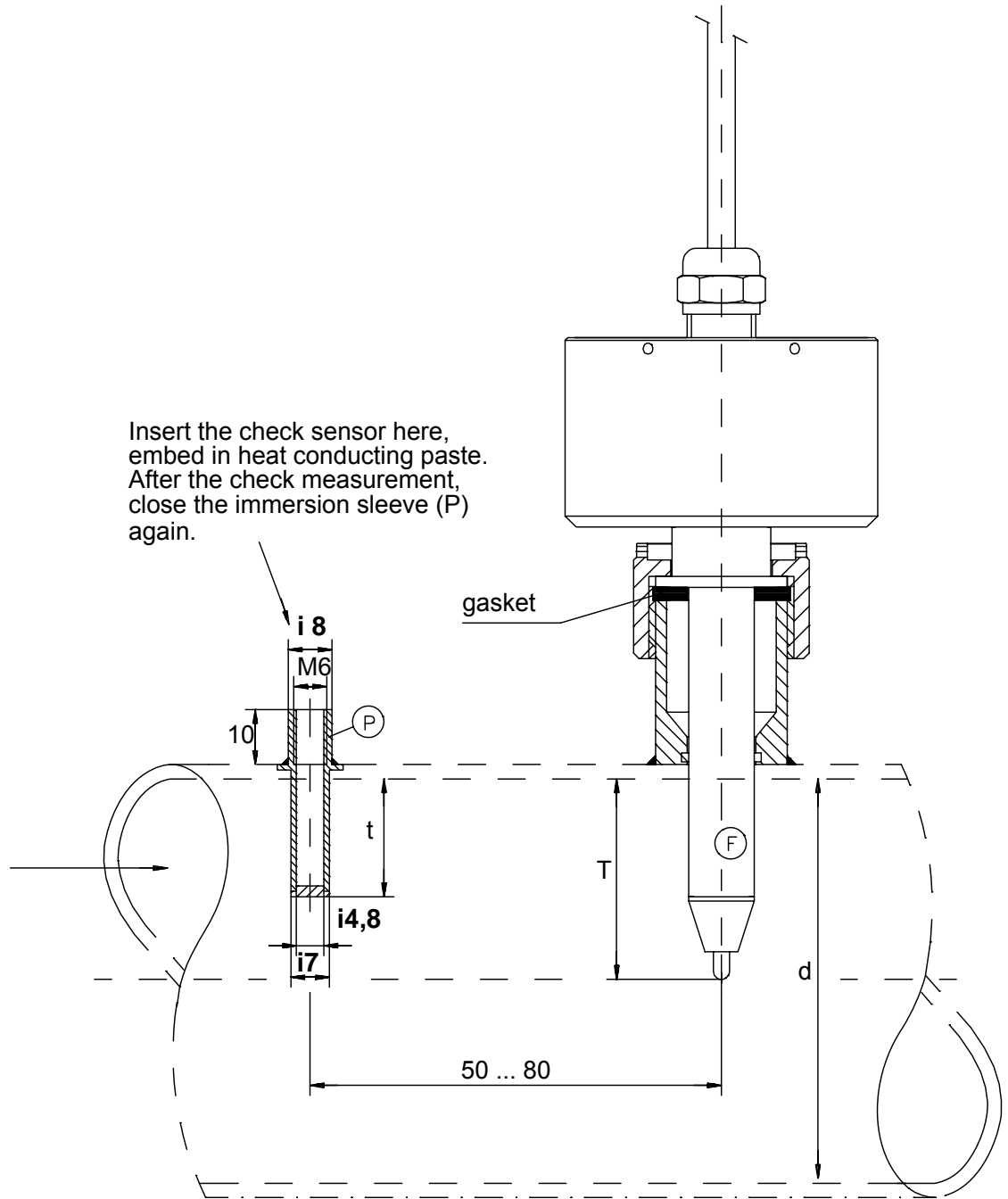
The temperature sensor has a standard 5 m cable with open ends.

Technical Data

Mechanical data											
Mounting/enclosure	Installation with integral thread G 1/2"										
Operating temperature of connecting line	- 30 ... + 60 °C										
Dimensions	∅ 32 mm, L = 150 mm										
Installation length	75 mm										
Installation position	any										
Test probe	stainless steel										
Weight	approx. 6 N (= 0.6 kg)										
Ambient conditions											
Operating temperature of connecting head	- 40 ... + 60 °C										
Operating temperature of connecting line	- 30 ... + 60 °C										
Protection type	IP 65 in accordance with EN 60529										
Equipment group/category type of protection	II 1/2 G EEx ib IIC T6										
Electrical data											
Cable connection	5 m cable, four-wired, shielded, with open ends to the connection with evaluation electronics.										
Device-specific data											
Measuring element	Pt 100 in accordance with DIN IEC 751, class B										
Measuring range	- 30 ... + 100 °C										
Response time	t ₉₀ < 15 s, calibration points at 0 °C and 50 °C										
Dimensions											
<p>Cu-sealing delivered</p> <p>Sealing grommet or sealing</p> <p>∅ 7</p> <p>76</p> <p>15</p> <p>∅ 32</p> <p>Number plate</p> <p>Connection:</p> <table border="1"> <thead> <tr> <th>Colour</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>orange</td> <td>I-O-UT</td> </tr> <tr> <td>black/white</td> <td>N+</td> </tr> <tr> <td>red</td> <td>N-</td> </tr> <tr> <td>brown</td> <td>GND</td> </tr> </tbody> </table> <p>213004.dwg</p> <p>Circuit diagram:</p> <p>or 4W</p> <p>rt bi</p>		Colour	Signal	orange	I-O-UT	black/white	N+	red	N-	brown	GND
Colour	Signal										
orange	I-O-UT										
black/white	N+										
red	N-										
brown	GND										

Mechanical Installation instructions

Temperature probe with union nut



IMPORTANT!

- Use only zone 1 instruments to take check measurements on A1 systems!
- Never use Hg thermometers (high inertia)!

Mechanical Installation instructions

Temperature probe with screw-in thread

Recommend installation depths:

Sensor:

$$T = d/3 \dots d/2 \text{ (mm)}$$

d is the inside diameter of the tube

Test bore hole:

$$t = T - 10 \dots T - 15 \text{ (mm)}$$

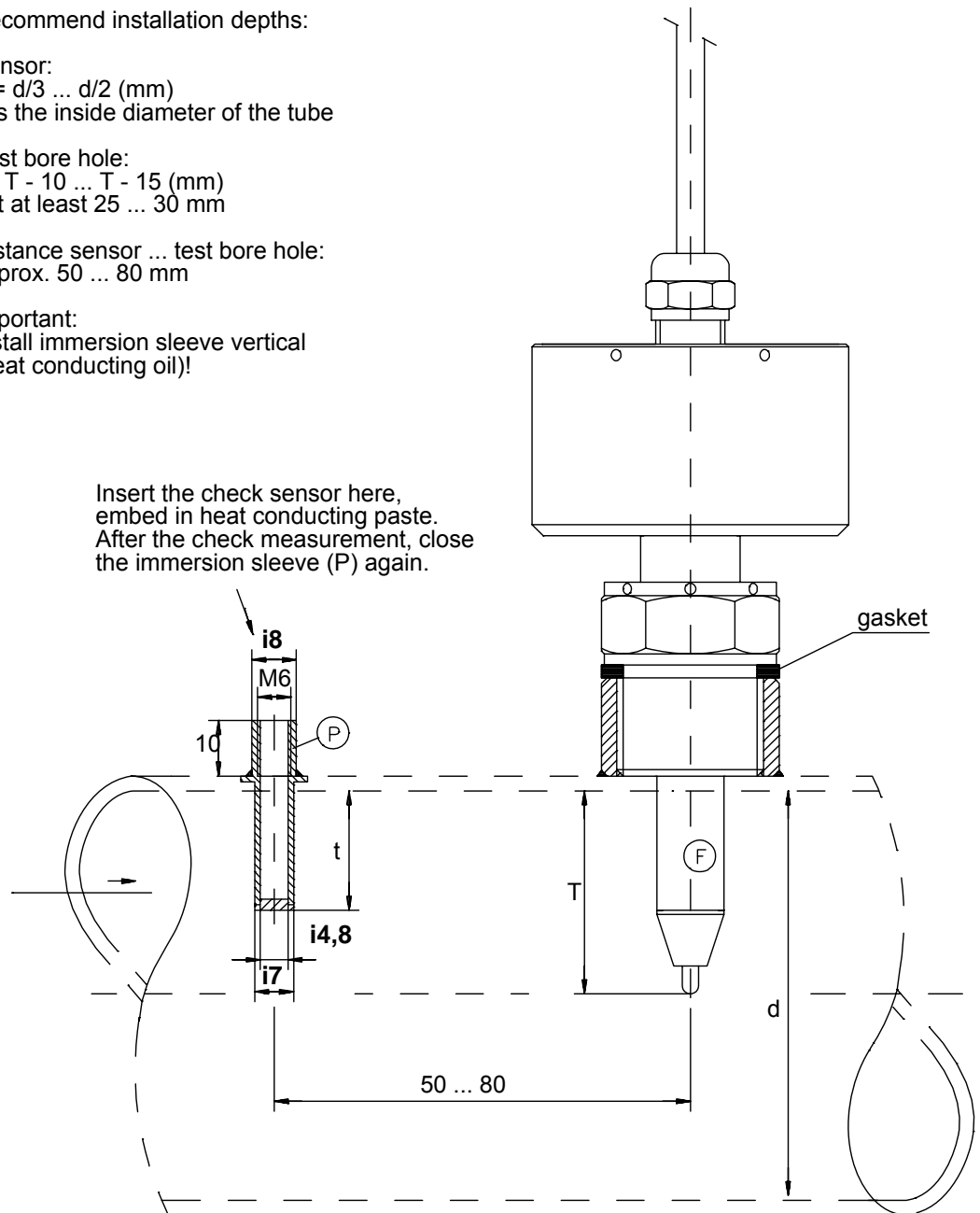
but at least 25 ... 30 mm

Distance sensor ... test bore hole:

approx. 50 ... 80 mm

Important:

Install immersion sleeve vertical
(heat conducting oil)!



IMPORTANT!

- Use only zone 1 instruments to take check measurements on A1 systems!
- Never use Hg thermometers (high inertia)!

3.3.4 Volume counter Ex type 6716-xx


Technical data

The built in shift encoder produces 100 or 25 pulses / revolution in the form of 3 rectangular-pulse signals out of phase by 12° (see pulse diagram).


Electrical parameters

Voltage supply	5 V ± 10 %
Power consumption	Max. 25 mA
Output	Open collector Max. load 30 V/15 mA per channel Max. low output $V_L = 0,4$ V

Cable assignment of the pulser for meter interface without serial number or series A

Signal	+ 5 V		K2	K3	GND	shield
Colour	green (GN)	white (WH)	yellow (YE)	grey (GY)	brown (BN)	shield 
Terminal for pulser I	11	12	14	16	17	18
Terminal for pulser II	19	20	22	24	25	26

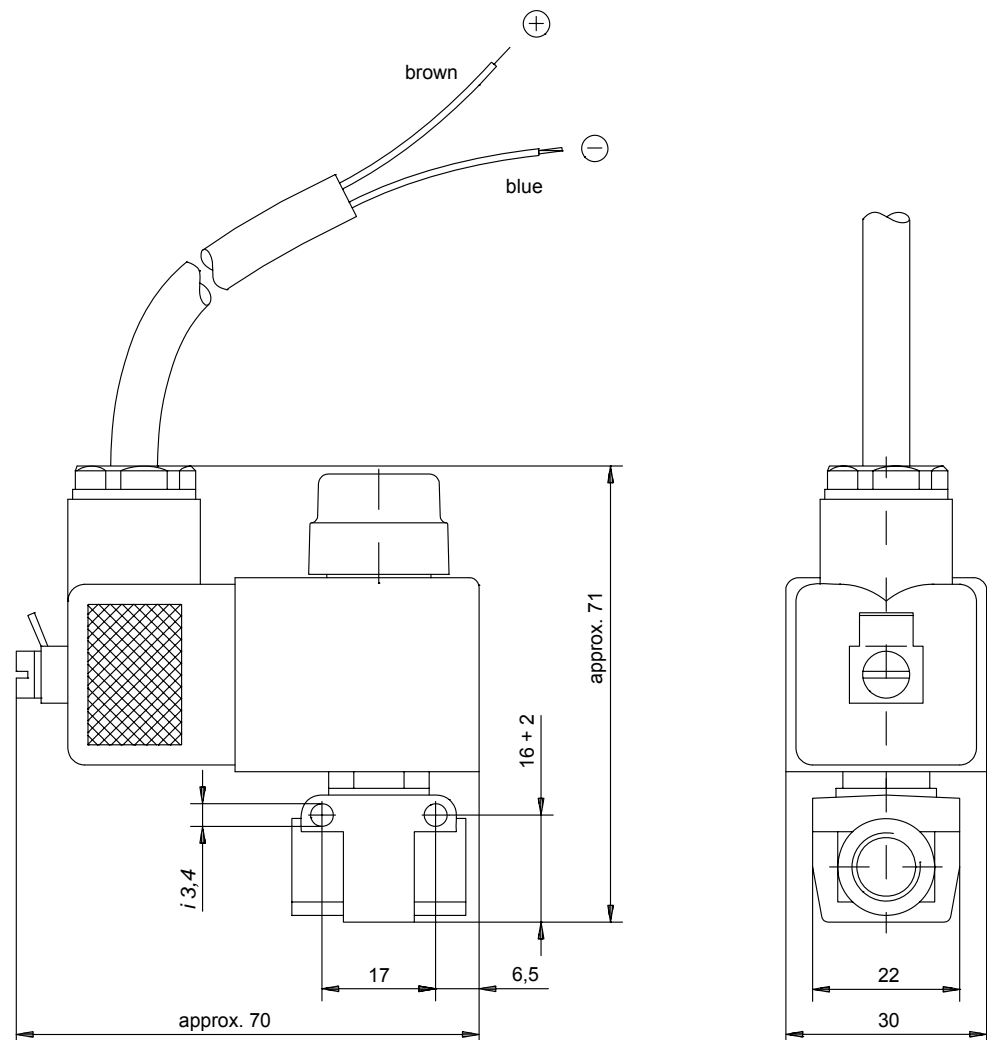
Cable assignment of the pulser for meter interface for series B

Signal	+ 5 V		K2	K3	GND	shield
Colour	green (GN)	white (WH)	yellow (YE)	grey (GY)	brown (BN)	shield 
Terminal for pulser I	13	14	15	16	17	18
Terminal for pulser II	21	22	23	24	25	26

3.3.5 Solenoid valve 3/2-way, Ex

Technical data

Pressure	0 - 10 bar
Ambient temperature	- 15 ... + 50 °C
Auxiliary energy	DC 24 V ± 10 %, DC 0,14 A
Medium temperature	Max. + 50 °C
Type of gasket	FKM (Viton)
Protection type	Ex s G4/Ex s T4 according to VDE 0171/SEV Registration no. PTB III B/E 29 796 IP 65 according to DIN 40050



3.4 Power supply for trucks with 24 V battery voltage



General

For trucks with 24 V battery voltage the power supply type 6781-12 (with input buffer and 24 V limitation) must be used.

Application

Type 6781-12 power supply is designed for direct voltage systems. It filters out interference signals and voltage peaks and enables a reliable supply for follow-up systems. The power supply is designed for input voltages from 16 to 35 V and output currents up to 8 A (see diagram 1).

Function

High operational reliability is guaranteed by an electronic over temperature cut-out and automatic cut-out in the event of overvoltage. Fast transients such as occur, for example, as the result of switching operations on inductive consumers, are bridged by an input filter.

When the power supply is installed in the driver's cab, a built-in P-NET limiting module enables non-Ex-approved components such as a printer or SSM cartridge station to be integrated in the P-NET ring in the driver's cab. It is also possible for these units to be switched off when necessary (e. g. in the refinery) by means of an external switch. As an option the power supply can be equipped with a separate output with a limited voltage of 24 V.

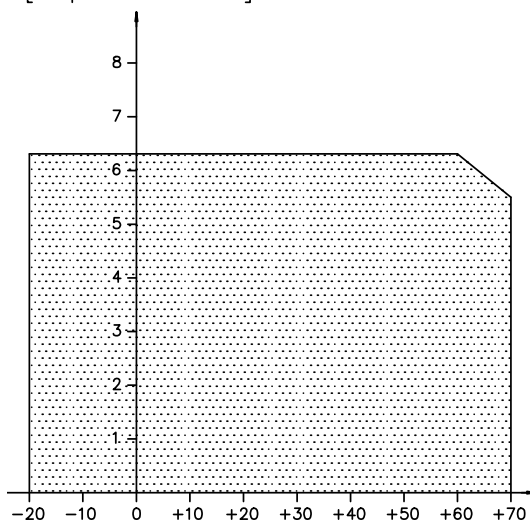
Technical data

Performance data	<p>without input buffer Input: $U_{in} = DC\ 16 \dots 35\ V$ Output: $U_{out} = U_{in} - 1\ V$ Output current: max. 8 A *</p> <p>with input buffer (optionally) bridging of voltage drops of the input voltage U_{in} $U_{in} = 12 \dots 24\ V \rightarrow U_{out} = 24\ V \pm 5\ %$ Output current: max. 1,25 A $U_{in} = 25 \dots 35\ V \rightarrow U_{out} = U_{in} - 1\ V *$ Output current: max. 8 A * Overvoltage switch-off at $U_{in} > DC\ 34\ V *$ Pulse load: max. 16 A/10 ms 2 output fuses: 4 A each Common mass feedback: 8 A</p> <p>separate output with 24 V voltage limitation (optionally) $U_{in} = 16 \dots 26\ V \rightarrow U_{MV\ out} = U_{in} - 2\ V *$ $U_{in} = 27 \dots 35\ V \rightarrow U_{MV\ out} = 24\ V \pm 5\ %$ Output current: 2 A 1 input fuse: 2 A</p>
Fuses	2 output fuses: each 4 A, common ground return: 8 A, separate output: 2A
Ambient conditions	Admissible operating temperature: - 20 ... + 70 °C (climatic category JSD according to DIN 40040)
Housing	Material: die-cast aluminium, Protection type: IP 65 according to DIN 40050 Dimensions: 160 x 160 x 90 mm
Mounting holes	4 holes $\varnothing\ 7\ mm$ for M6, spacing horizontal 140 mm, vertical 180 mm
Connections	Cable glands: 6 x PG9, conductor cross section: max. 1,5 mm ²

*) with rated conditions $22 \pm 2\ ^\circ C$

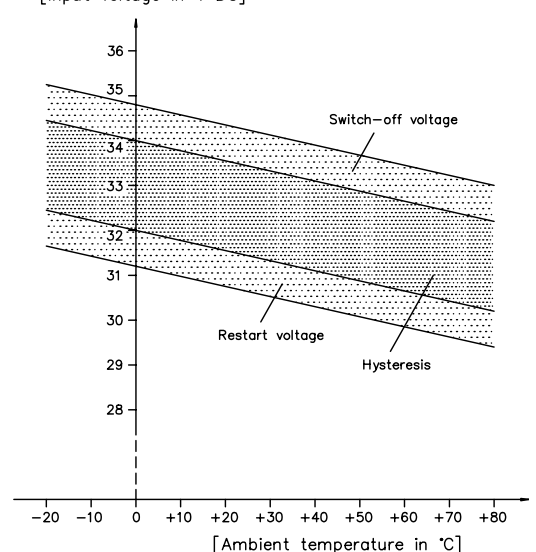
Performance diagram

[Output current in A]



Automatic switch-off for overvoltage

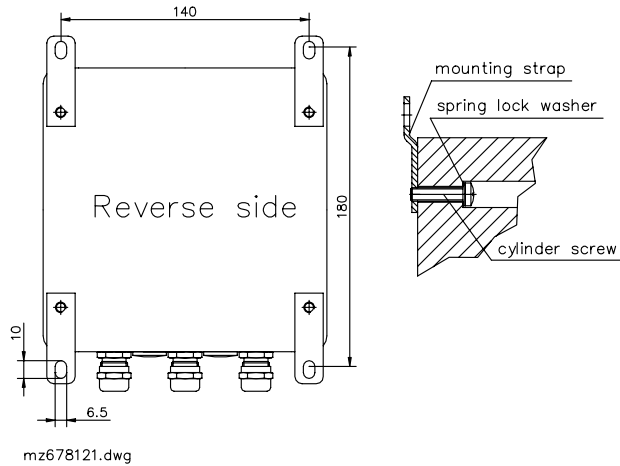
[Input voltage in V DC]



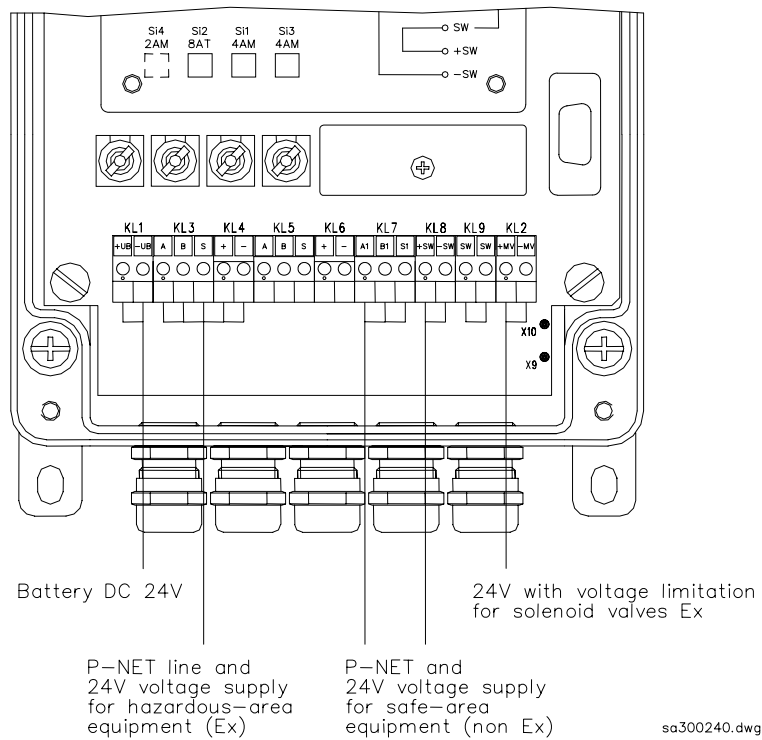
Fulfillments

Power Supply, type 6781-12, with 24 V limitation (magnetic valve)	Order no.
without input buffer (U _{in})	U899 10 678112001
with input buffer (U _{in})	U899 10 678112011

Mounting



Wiring



3.5 Power supply for trucks with 12 V battery voltage

General

For trucks with 12 V battery voltage, the power supplies type 6781-15 and type 6781-12 (without input buffer) are necessary.

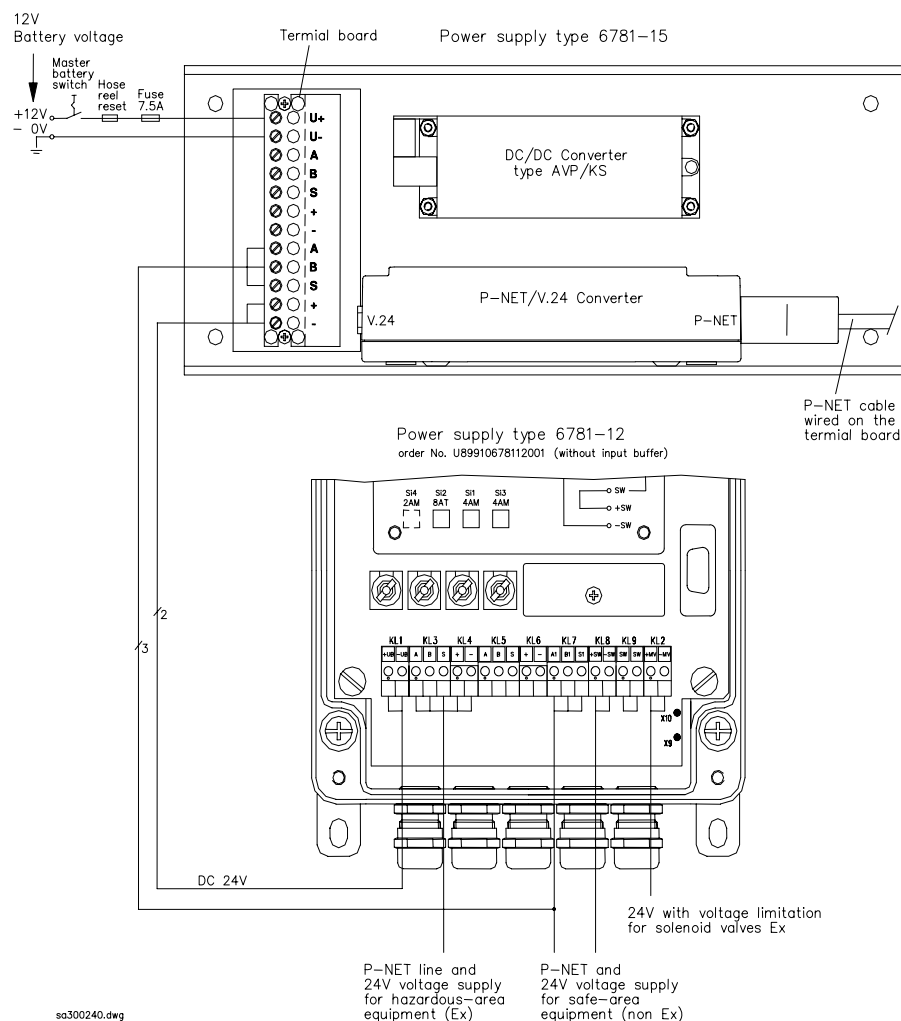
The power supply unit type 6781-15 consists of:

- DC/DC-converter and the
- P-NET/V24-converter, type 4386 P041.

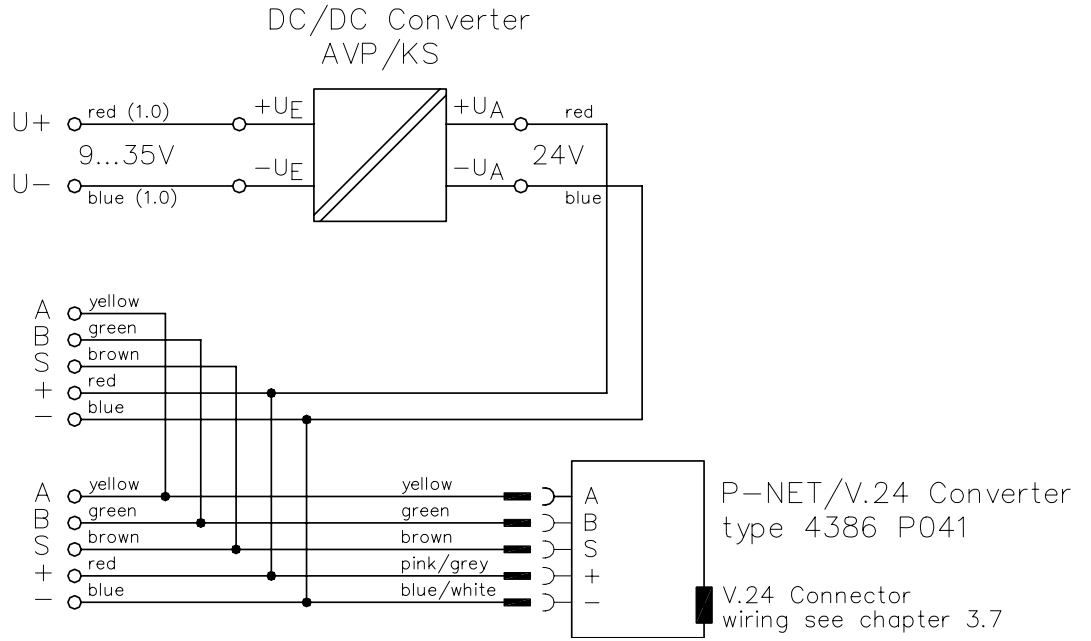
The DC/DC-converter transforms the DC 12 V supply voltage from the truck-battery to DC 24 V, which is necessary for the BARTEC components. The P-NET/V 24 converter is a processor controlled interface, which adapts the modes/radio device with the (V.24-interface) to the P-NET field bus.

The power supply type 6781-12 is necessary due to safety requirements (Ex equipment). Caution: The hazardous-area equipments (Ex) and the safe-area equipments (non-Ex) must be connect on different terminals!

Wiring



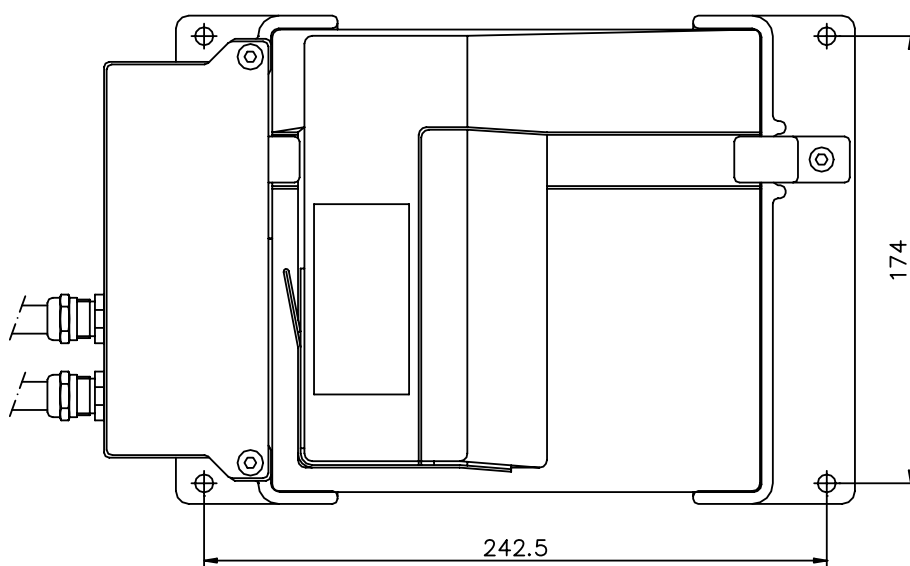
Internal wiring of the unit



3.6 Slip printer 6881-1

Technical Data

Voltage	DC 24 V ± 10 %
Power consumption	In standby approx. 100 mA, when printing approx. 800 mA, max. 1,5 A
Ambient conditions	Operation temperature: + 5 ... + 35 °C Storage temperature: - 30 ... + 60 °C



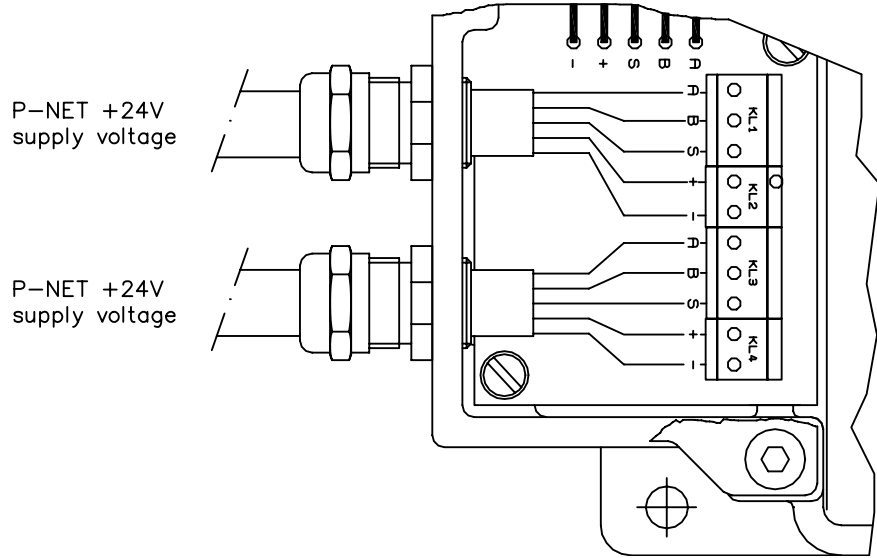
DIP switch settings

The DIP switches are located in the bottom of the unit. The printer has to be taken out of its holder in order to be able to make the settings. For trouble-free operation the unit should be operated only with standard settings (see below).



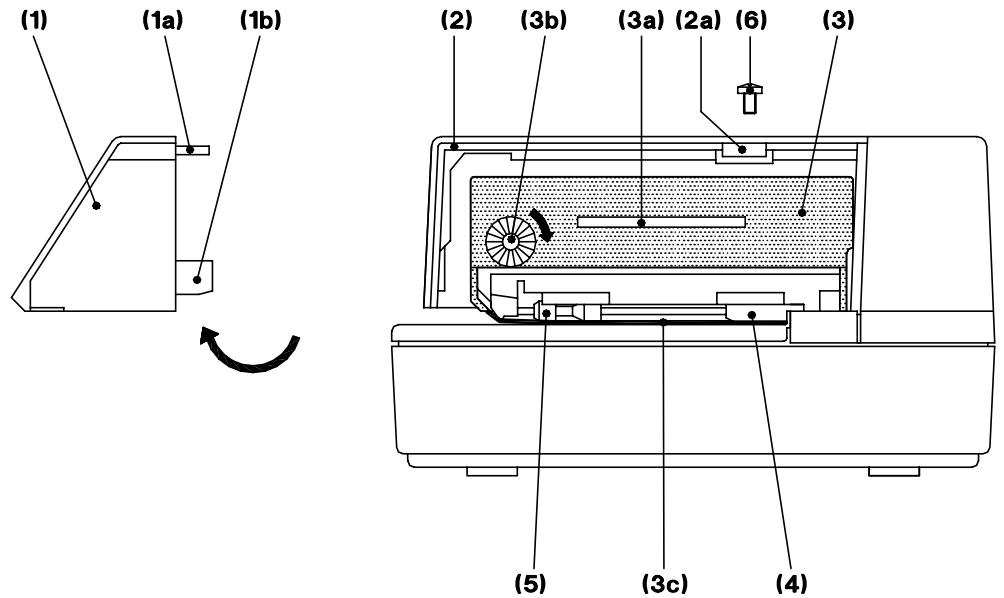
system	3002
adress	\$41

Wiring

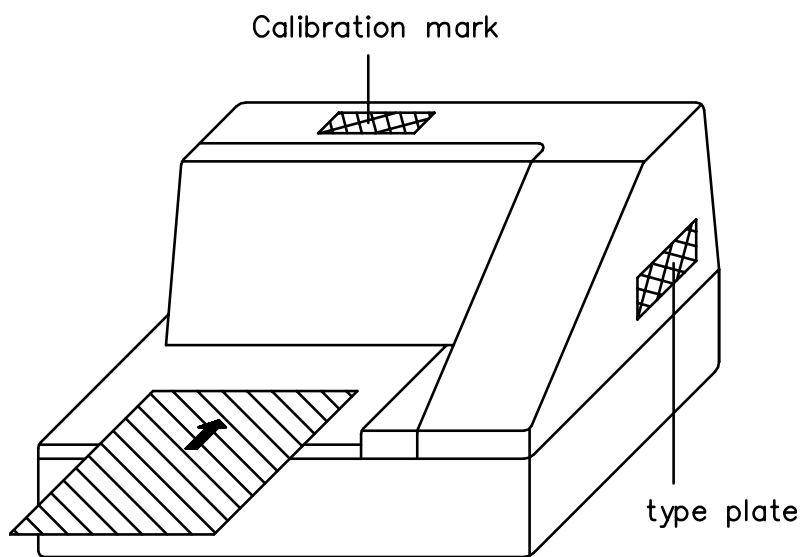


Changing the printing ribbon

First undo the screw **(6)** or at new series lift the latch and take off the cover **(1)**. Then pull off the old ribbon cassette **(3)**, holding it by its handle. Now insert the new cassette and press in firmly until it latches in place. Finally, tension the ribbon by turning the button **(3b)** and put the cover **(1)** back on.



Stamp position plan



3.7 Ticket printer type 6881-30

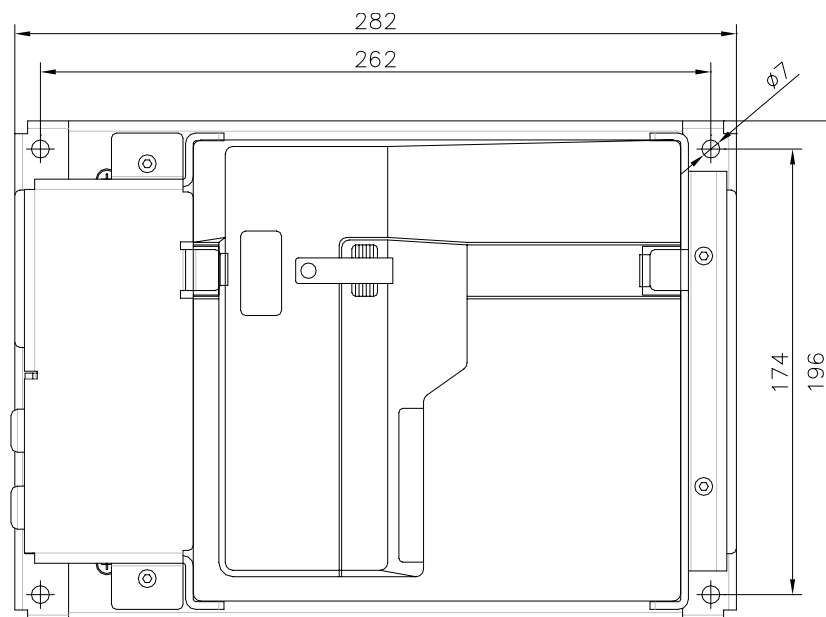
Technical Data

Electrical data	
Auxiliary energy	DC 24 V ± 10 %, max. 1,0 A
Connection type	Terminal connection, cable feed via cable screwing PG9 in the printer holder
Interface	Fieldbus P-NET, P-NET identification no.= 5812
Ambient conditions	
Operating temperature	5° C ... 40°C
Storage temperature	-10° C ... + 50°C (without paper and ink ribbon)
Climatic classification/protection type	KYF / IP40
Mechanical data	
Casing	Voucher printer = plastic casing, grey Printer holder = aluminium sheet, 3 mm
Weight	approx. 20 N ≅ 2,0 kg including printer holder
Mounting site	Only in dry and clean environments by complying with the admissible operating temperature and climatic classification. Preferably in the driver's cab.
Installation position	Preferably horizontal (vertical position with cable connection upwards is also possible)

Important NOTE:

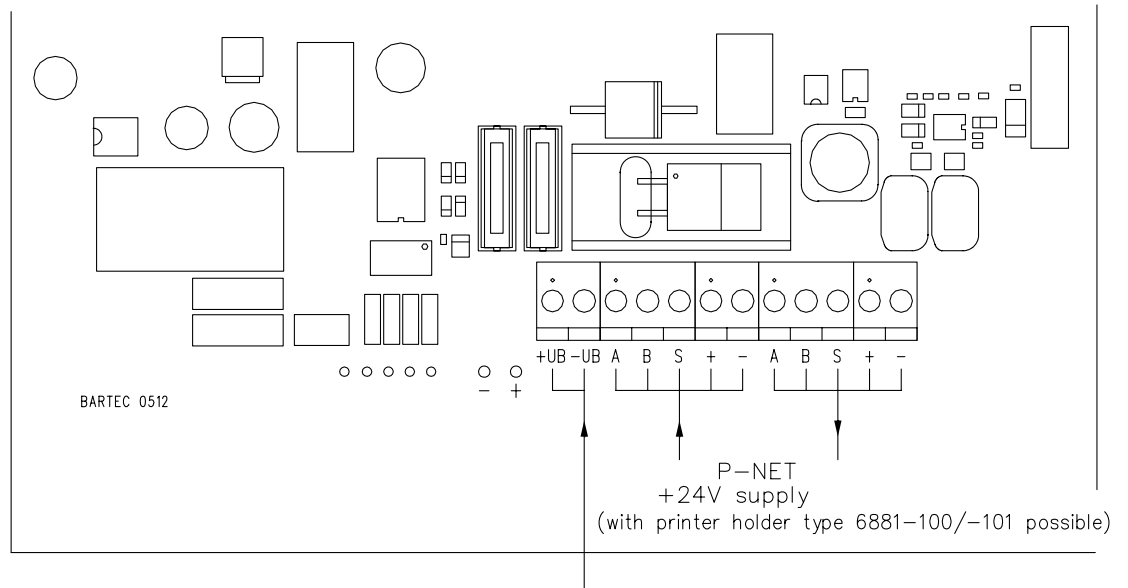
To log on the printer in the system configuration, you need the "A. no." of the printer holder. You find this number on the type plate of the printer holder, type 6881-100.

Mounting and dimensions



235934.dwg

Wiring



235934.dwg

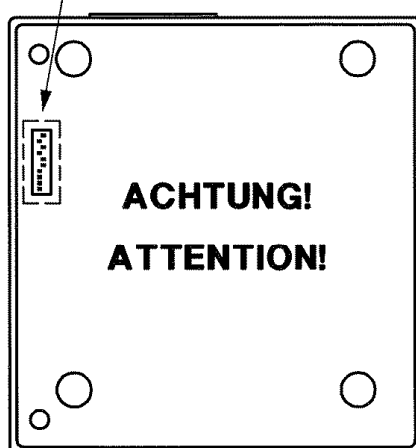
as an alternative, direct power supply from on-board power supply of truck is possible (only with printer holder type 6881-101 possible)

After the mounting of the printer the RS 232-interface cable and the cable of the printer holding have to be connected and adjusted.

Dip switch setting

Drucker Typ 6881-3x (Unterseite):
zum Ändern der Dipschaltereinstellung Aufkleber entfernen

Printer Type 6881-3x (bottom side):
remove the adhesive label
to change the Dip-switch setting



Druckerhalterung Typ 6881-100/-101
ohne Serienindex:
Dipschalter 1 + 3 am Drucker = ON
Dipschalter 2, 4, 5, 6, 7, 8, 9, 10 = OFF

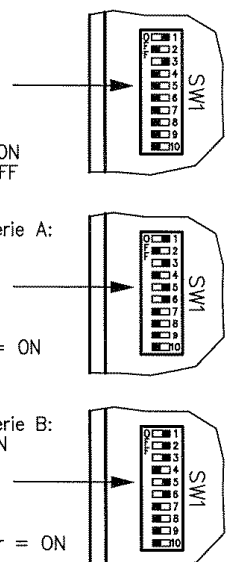
Holder for printer Type 6881-100/-101
without serial index:
Dip-switch no. 1 + 3 at the printer = ON
Dip-switch no. 2, 4, 5, 6, 7, 8, 9, 10 = OFF

Druckerhalterung Typ 6881-100/-101 Serie A:
Dipschalter 1, 3, 5, 6 am Drucker = ON
Dipschalter 2, 4, 7, 8, 9, 10 = OFF

Holder for printer Type 6881-100/-101
with serial index A:
Dip-switch no. 1, 3, 5, 6 at the printer = ON
Dip-switch no. 2, 4, 7, 8, 9, 10 = OFF

Druckerhalterung Typ 6881-100/-101 Serie B:
Dipschalter 1, 2, 3, 5, 6 am Drucker = ON
Dipschalter 4, 7, 8, 9, 10 = OFF

Holder for printer Type 6881-100/-101
with serial index B:
Dip-switch no. 1, 2, 3, 5, 6 at the printer = ON
Dip-switch no. 4, 7, 8, 9, 10 = OFF



Zusätzlich ist zu beachten:

Für die Anmeldung des Druckers Typ 6881-3x in der Systemkonfiguration muß die A.Nr. der Druckerhalterung verwendet werden. Sie finden diese Nummer auf dem Typenschild der Druckerhalterung Typ 6881-100/-101.

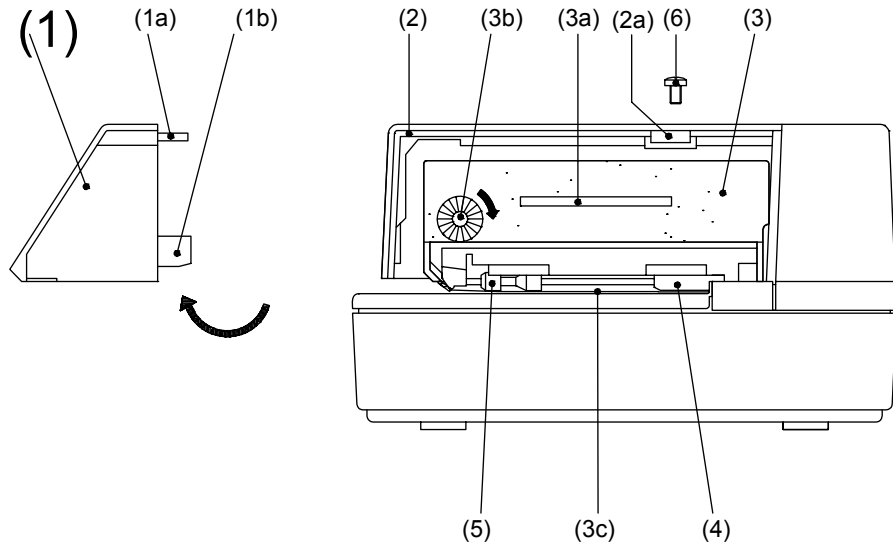
Very important:

For configuration of the printer Type 6881-3x within System 3002 please use serial number of the holder for printer Type 6881-100/-101 (A.Nr. of the type plate).

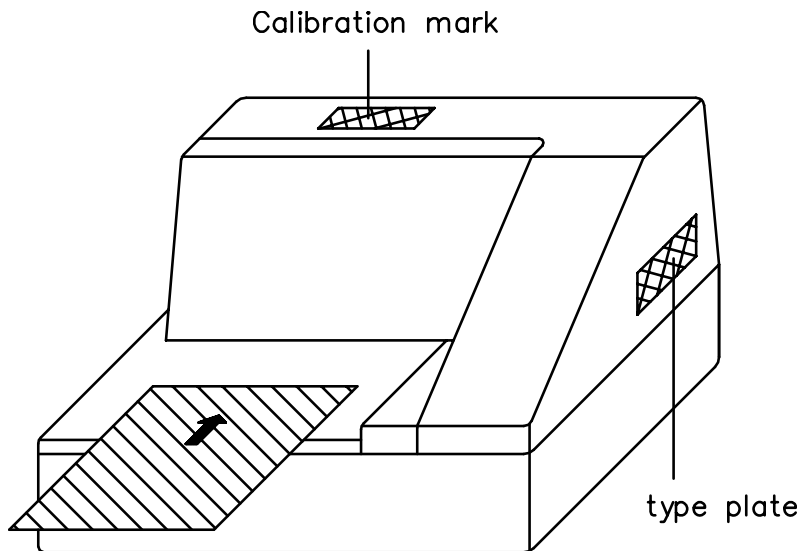
235934a.dwg

Change the ink ribbon

Loosen the screw (6) and take off the cover (1). Hold the old ribbon cassette (3) at the handle (3b) and pull it off. Now insert the new ribbon cassette and press in firmly until it snaps into place. Finally, tension the ribbon by turning the button (3b) and put the cover (1) back on.



Stamp position plan



3.8 SSM cartridge station type 6766-11

General description

The SSM cartridge station type 6766-10/11 reads and writes cartridges of type 6765-1x and 6836-20/-40. It is used in system 3002 as a data storage unit with easy-to-exchange data carriers. Data transfer is performed via the field bus interface (P-NET).

Red LED

General errors:

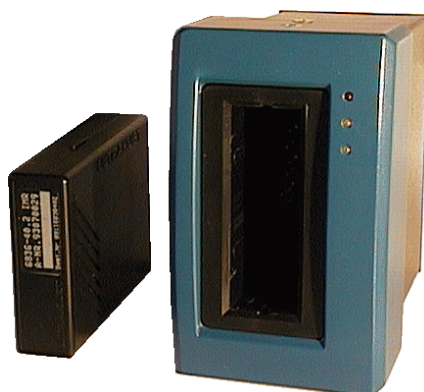
- No cartridge in the shaft
- Cartridge defective
- Operating voltage in the cartridges is too low

Yellow LED

- Lights up when the cartridge station is accessed

Green LED

- Light-emitting diode flashes - normal mode
- Light-emitting diode does not flash - cartridge is no longer working. Switch off the SSM cartridge station briefly to rectify the operating voltage fault.



Design

Rugged construction, no moving parts. Case made of sheet steel. Front panel made of blue plastic. Electronics divided among 3 PCBs, with isolated P-NET interface. Electronics and cassette shaft connected by a ribbon cable with a plug at one end. Operating states indicated by three light-emitting diodes at the front. Indicator for level of charge in the cartridges back-up batteries.

Installation

- Surface-mounting version with 4 mounting holes in the projecting rear wall. Can be secured with 4 x M5 hex socket head screws or with 4 x 4 mm blind rivets.
- Flush-mounting version for control panel slots, with clamping elements. Electronics can be replaced after removing the cover hood.

Cartridges

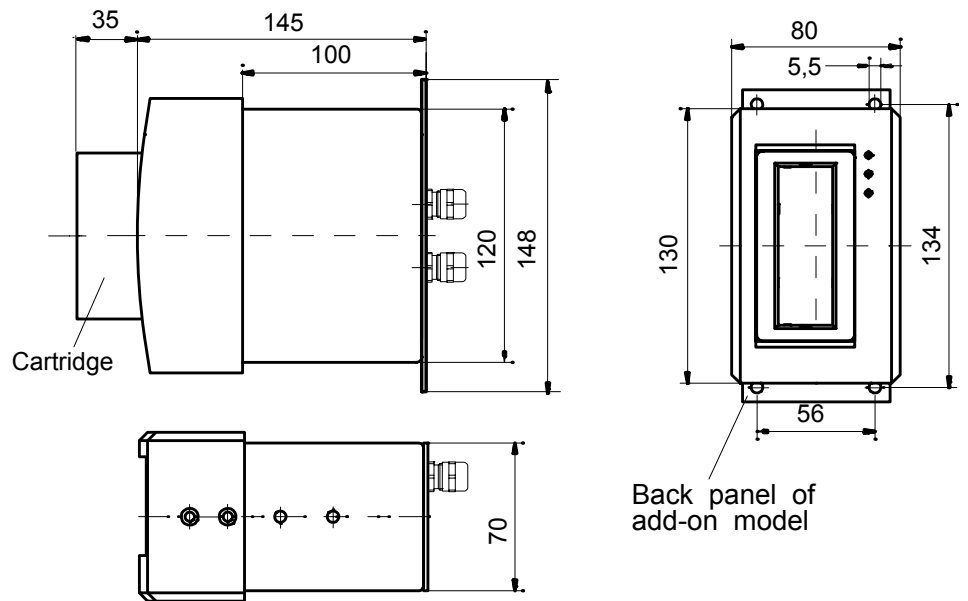
The cartridges are exchangeable, encapsulated, non-volatile mass memories. They contain battery-backed SRAMs as memory modules and are available in capacity increments up to 1 Mbyte. Future increases of capacity will have no effect on the SSM cartridge station's operation (upwards compatible).

Technical data

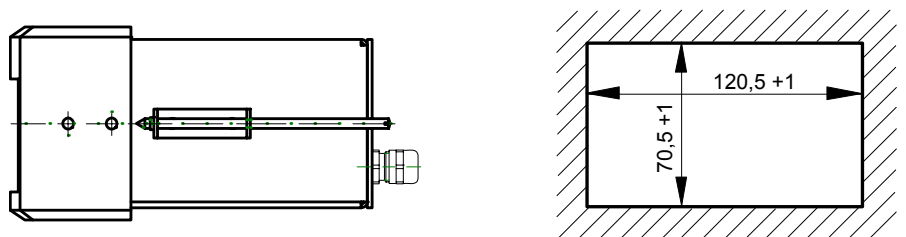
Auxiliary energy	Supply voltage: DC 15 ... 35 V, (via power supply type 6781-xx or similar) Rated current at DC 24 V: approx. 60 mA
Electrical connections	Screw terminals for P-NET ring and operating voltage on PCB on the inside rear rear wall Cable routing through 2 x PG7 glands
Ambient conditions	Field bus interface (P-NET) serial, asynchronous, baud rate 76 800 bit/sec, Max. lead length 1 200 m P-NET Ident.-No: 5917
General parameters	Weight: approx. 13 N (1,3 kg) Dimensions: 150 x 80 x 140 mm Case: rugged steel plate case, powder-coated in blackish gray, Front panel in plastic, blue
Ambient conditions	Operating temperature: - 25 ... + 60 °C Storage temperature: - 30 ... + 75 °C Climatic category: HUF2. Protection type: IP30
Installation	Surface-mounting version: with mounting plate. Fixing with 4x M5 hex socket screws or with 4 x 4 blind rivets Flush-mounting version: For installation in control panel slots, Fixing with clamping elements
Cartridges	Type: 6765-10. Dimensions: 24,5 x 74 x 106 mm Weight: approx. 2 N (= 0,2 kg) Memory capacity: 128 kByte, 256 kByte, 512 kByte, 768 kByte, 1 MB Memory: Battery-backed SRAMS, encapsulated

Mounting

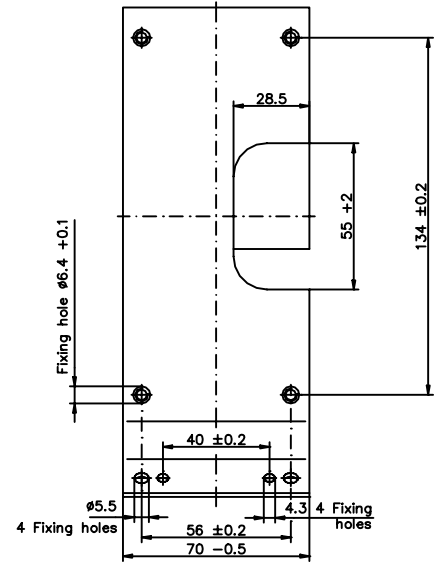
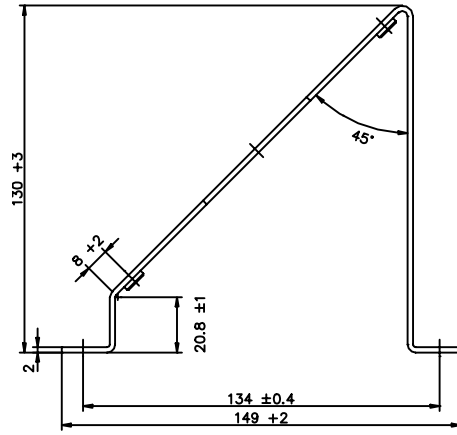
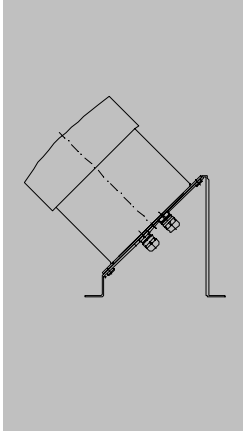
SSM cartridge station - dimensions



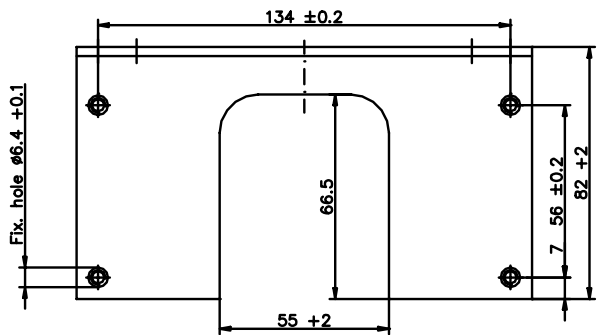
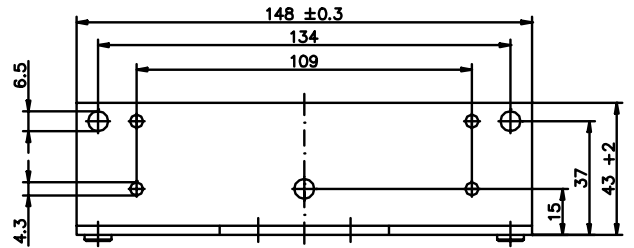
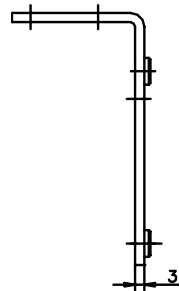
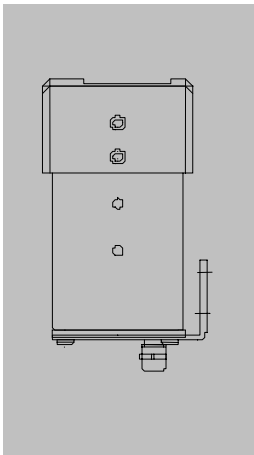
Flush mounting of the SSM cartridge station, with clamping elements.



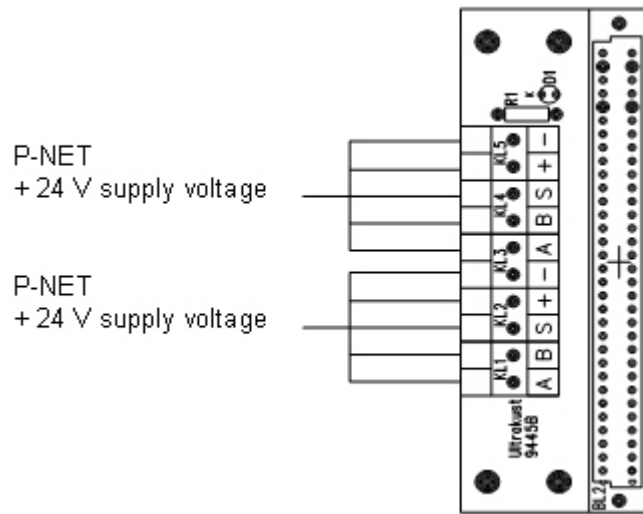
Surface-mounting version with mounting bracket for console mounting.



Surface-mounting version, with wall bracket for wall mounting.



Wiring



Signal	A	B	S	+	-
Core colour with cable U660 10 2 (new), (power supply 6781-11)	YE	GN	Shield	RD	BU

3.9 SSM cartridge station type 6766-12

Data storage unit with replaceable cartridge.

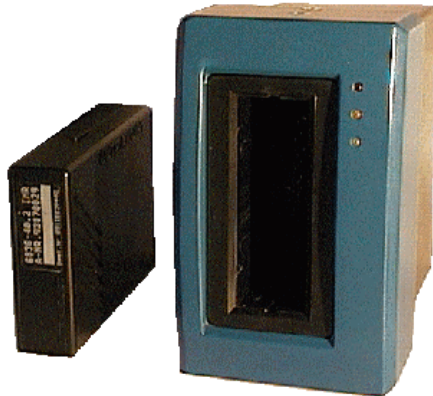
For type 6765-1x, 6836-20 and 6836-40 solid state memory cartridges (read/write).

Data exchange with other units via fieldbus (P-NET).

Direct PC-connection via RS-232-interface and transmission-software for Windows.

Highly secure data transfer and storage.

Two models (vehicle and office-version) for mobile and stationary applications.



Application

The SSM cartridge station type 6766-12 has been designed for external data storage within the 3002 system. Because of its robust design, it can be used in tank trucks and in milk collecting trucks. The easy connection to the RS-232-interface enables the use for recording schedule data and for reading data recorded during a tour. The available PC-software is compatible with all platforms (Windows '95 and higher).

In addition, the SSM cartridge station can be used in any environment where solid state memory cartridges of the above type and a P-NET fieldbus exist

Read / write unit for solid state memory cartridges

- For replaceable cartridges with non-volatile memory chips.
- Robust design for stationary and mobile environments; no moving parts.
- Serial field bus interface (P-NET), electrically separated.
- Status and error LEDs
- Voltage control of backup batteries in RAM cartridges.
- RS-232-interface for connection to PC.
- Transmission-software and direct embedding in all Windows-platforms (with Windows '95 and higher).

Function

For the storage operation each a SSM cartridge is to insert into the cassette shaft in front of the device. Cassettes can be removed or exchanged easily.

There are three status and error LEDs on the front panel:

- Red LED (top):
Lights up in case of an error such as “Cartridge defective” or “Battery voltage too low”.
- Yellow LED (center):
Lights up when the cartridge is being accessed.
- Green LED (bottom):
Blinks during normal operation.

Models

Both versions can only be used with a connection-set.

Electrical connection

Connection of P-NET-fieldbus and operating voltage using screw-type terminals inside the back panel.

To replace electronic components, the cover must be removed.

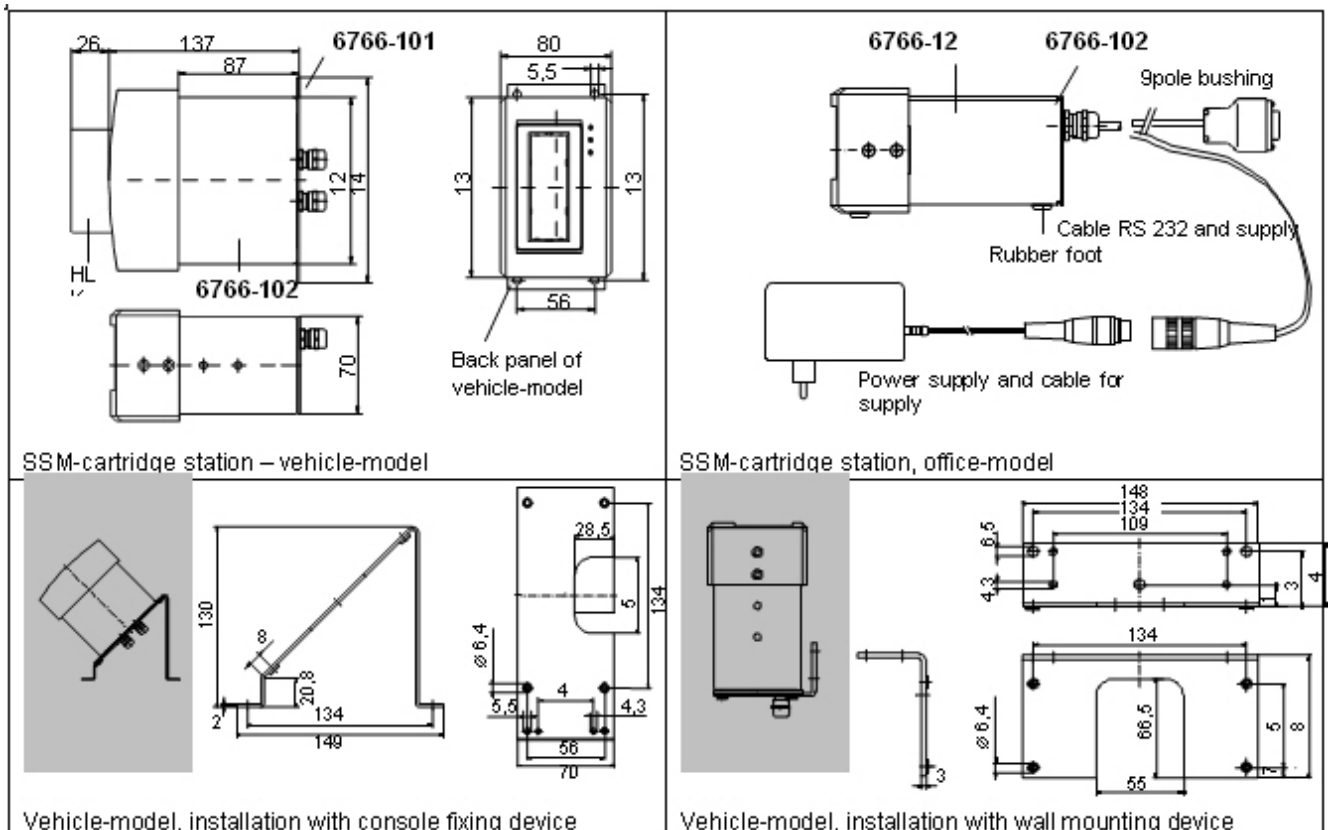
Solid state memory cartridges (SSM)

These cartridges are replaceable, integrated, non-volatile storage media. They contain SRAMs with battery backup and are available with different capacities of up to 4 MByte

Technical data

Auxiliary energy	Supply voltage: DC 15 ... 35 V (via power supply type 6781-xx or similar, nominal current at DC 24 V: approx. 60 mA)
Electrical connection	Screw-type terminals for P-NET-fieldbus, RS-232-interface and operating voltage on board inside the back panel, Cable feed via 2 x PG7
Interfaces	Fieldbus interface (P-NET): serial, asynchronous, baud rate: 76800 bit/s max. cable length : 1200 m P-NET-ID-No.: 5917 RS-232-interface baud rate: 115200 bit/s max. cable length : 3 m no HW-handshake
General parameter	weight: approx. 13 N (\approx 1,3 kg) dimensions: 137 x 80 x 148 mm housing: robust sheet steel casing with black-grey powder coating front panel: plastics, blue
Ambient conditions	operation temperature: -25 ... +60 °C storage temperature: -30 ... +75 °C climatic class: HUF2 protection mode: IP30

Dimensions



3.10 P-NET/V.24-Converter type 4386 P 041

The P-NET/V.24-converter is a μ p-controlled interface, which adapts devices with V.24-interface to the P-NET field bus.

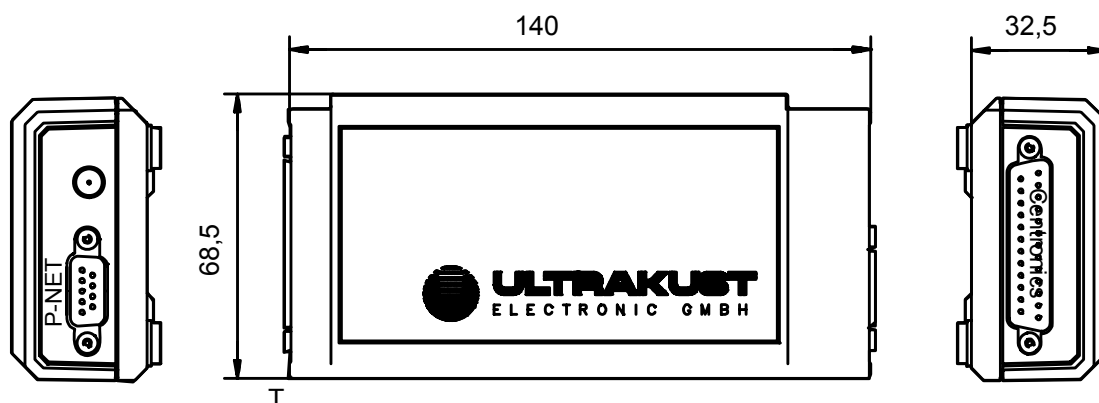
P-NET / V.24-converter for connecting to the P-NET field bus:

- two V.24-interfaces (RS 232 C),
- data inquiry, control and, setting of the transmission parameters via a galvanically separated P-NET field bus, interface (RS 485),
- secure communication by a built-in-test equipment.

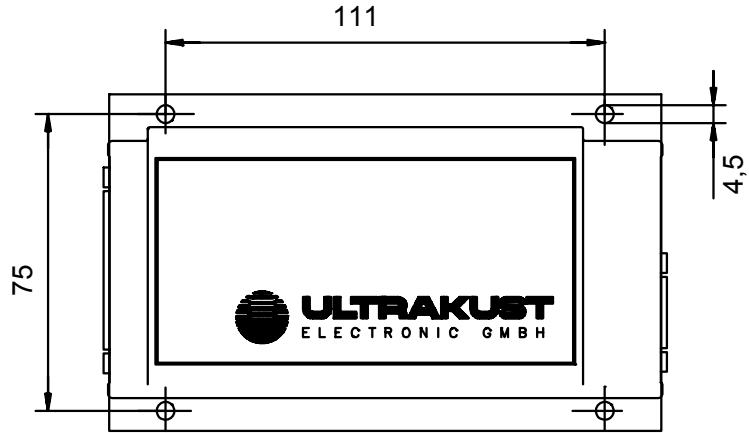
Technical data

V.24-Port	1 serial interface RS 232 C (RxD, TxD, 4 handshake lines) 1 serial interface RS 232 C, two-wire (RxD, TxD) Baud rate (75 ... 19200 baud) Length of words, protocol and mode settable via P-NET Level \pm 12 V, cable length max. 20 m
P-NET-Port	Serial, asynchronous RS 485, galvanically separated 76800 baud, P-NET protocol, length of line max. 1200 m
Connection	9-pol. socket (P-NET), 25-pol. plug (V.24), jack bush (power supply)
Power supply	Auxiliary voltage 10 ... 30 V DC \pm 10 %, ripple 150 mV eff. Power consumption max. 100 mA.
Ambient conditions	Nominal condition 23 $^{\circ}$ C \pm 2 $^{\circ}$ C Admissible operating temperature: 0 ... 50 $^{\circ}$ C Admissible storage temperature: - 10 ... + 70 $^{\circ}$ C Climatic class KWF according to DIN 40040
Housing	Desk-top housing, black plastic, protective system IP 30 Dimensions 144 x 68,5 x 36 mm
Weight	Approx. 2,5 N (= 0,25 kg)

Dimensions



Holes for mounting (in connection with set of mounting 4386-1-03)

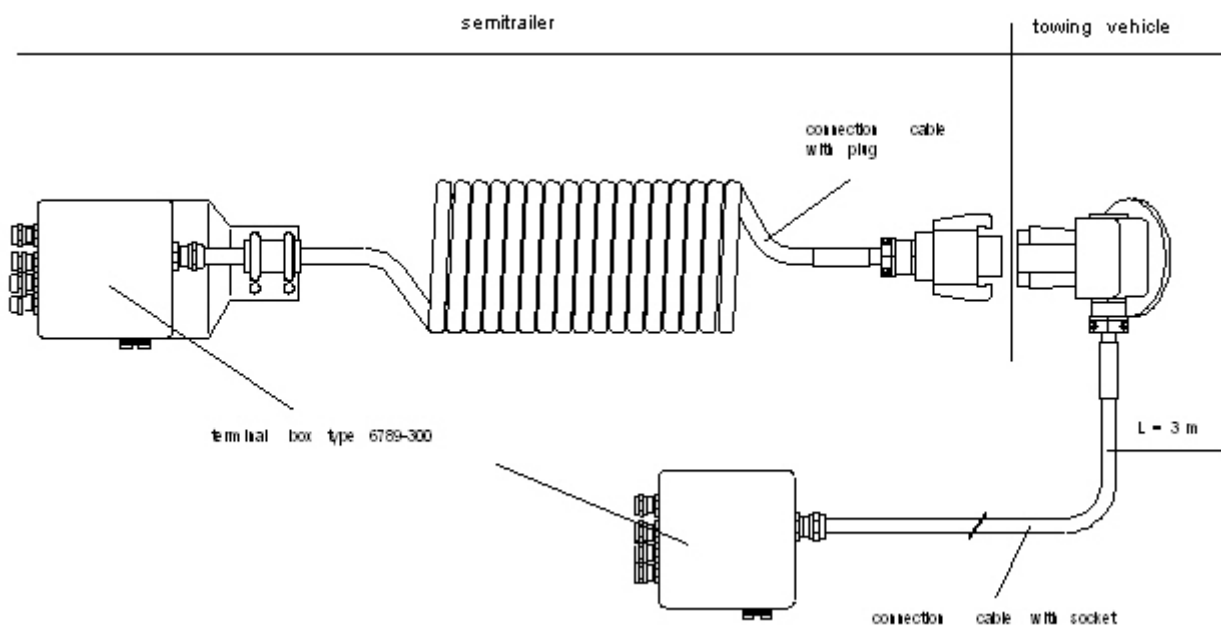


Assignment 9-pole D sub. plug	Signal	Colour
	PIN 5 = P-NET GND PIN 3 = P-NET A PIN 8 = P-NET B PIN 7 = + Power supply PIN 2 = - Power supply	brown yellow green grey/pink white/blue
Assignment 9-pole D sub. plug	Signal	Colour
	PIN 2 = TxD PIN 3 = RxD PIN 4 = RTS PIN 5 = CTS PIN 6 = DSR PIN 10 = DTR PIN 7 = GND PIN 14 = TxD PIN 16 = RxD PIN 22 = + 5 V PIN 23 = + 5 V PIN 24 = GND PIN 25 = GND	(CH A) (output) (CH A) (input) (CH A) (output) (CH A) (input) (CH A) (input) (CH A) (output) (CH A an CH B) (CH B) (output) (CH B) (input) voltage for card reader

3.11 Cable combination semitrailer type 6789-50

Function

The cable combination semitrailer is used to join together those electronic components installed on the towing vehicle with those on the semitrailer. There are two sets of three leads for the P-NET ring, two leads for the 24 V supply voltage and two free reserve leads.

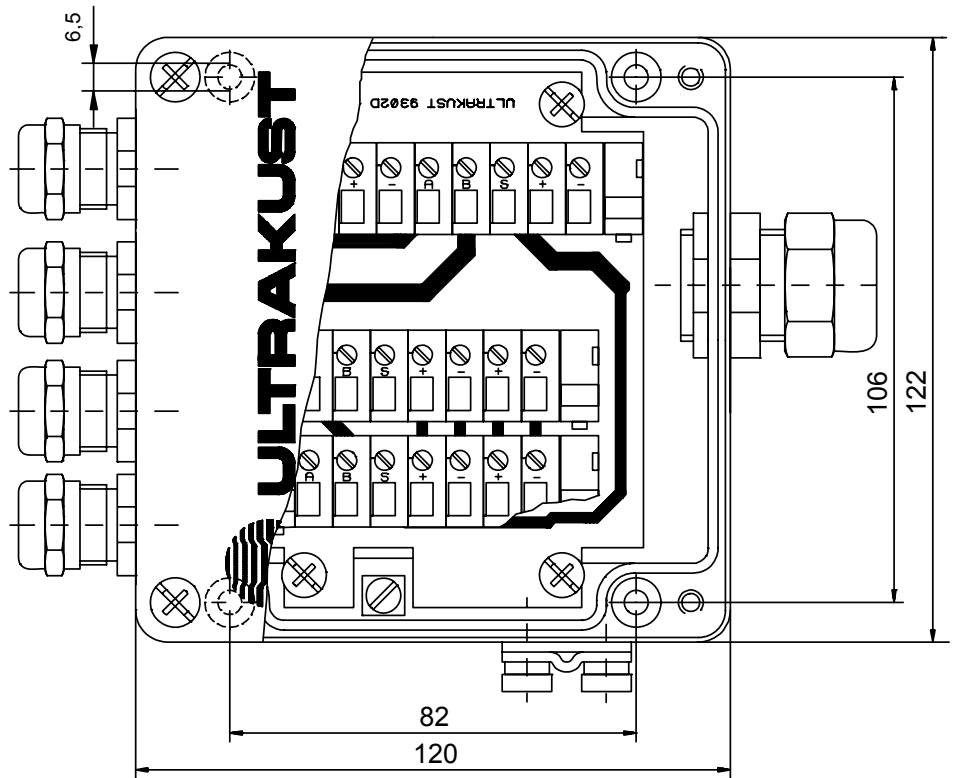


Technical data

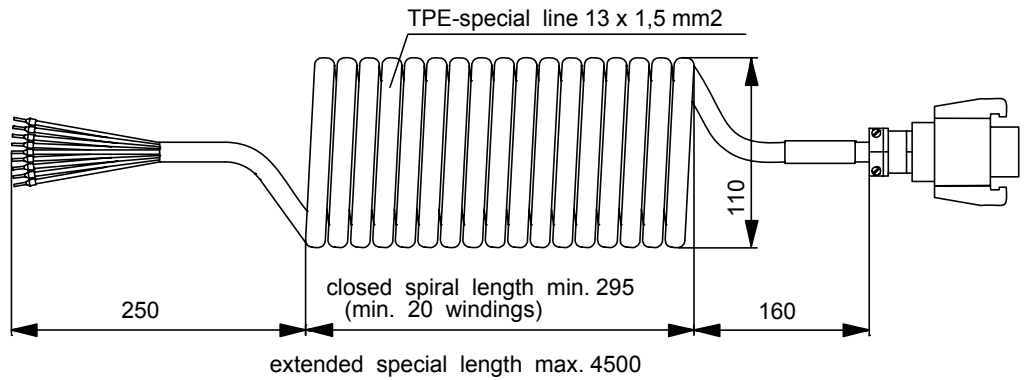
Voltage	DC 24 V/4 A
Protection type	IP 65 according to DIN 40050
Protection type 'e'	EEx e II T4
Admiss. ambient temperature	- 20 ... + 50 °C
Climatic category	JWD according to DIN 40040
Plug-type connection	10-pole (2 x 3 leads for P-NET, 2 x 24 V supply voltage, 2 free reserve leads)
Conductor cross section	1,5 mm ²

Dimensions

Terminal box type 6789-300



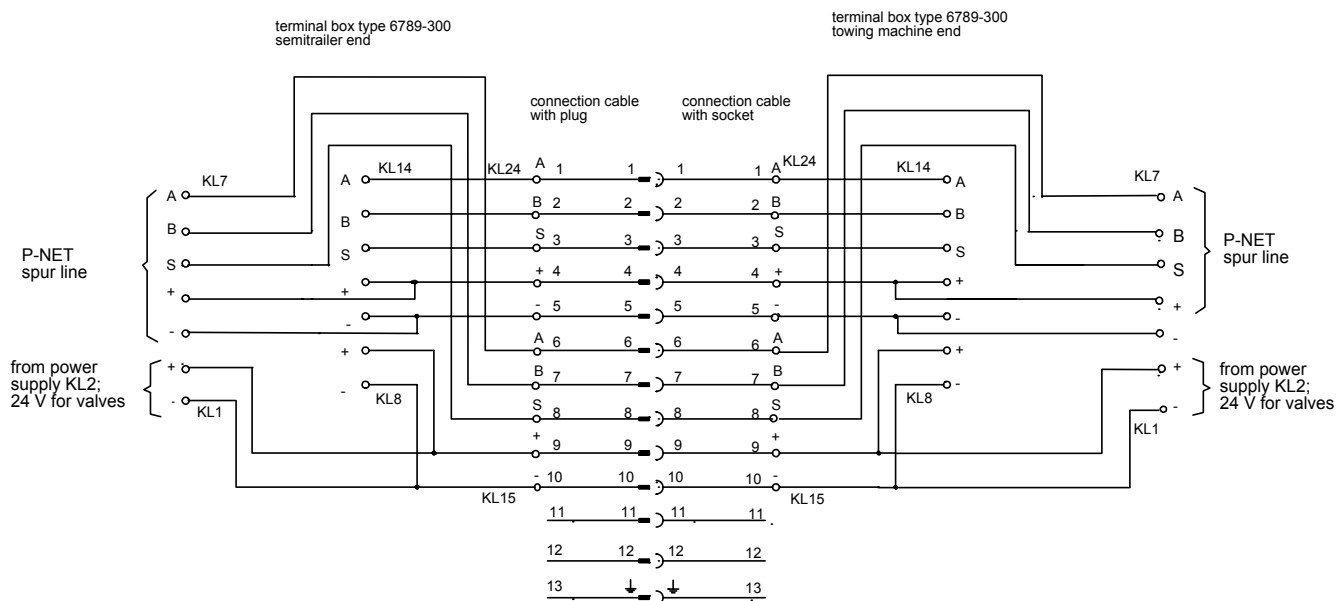
Connection cable with plug



Mounting and wiring

For volume measurement (TMU temperature compensation system) the units are not connected via a P-NET ring but with a spur line, i. e. there is no need for the last unit to be connected to the first unit (see Chapter 2, "Block diagrams").

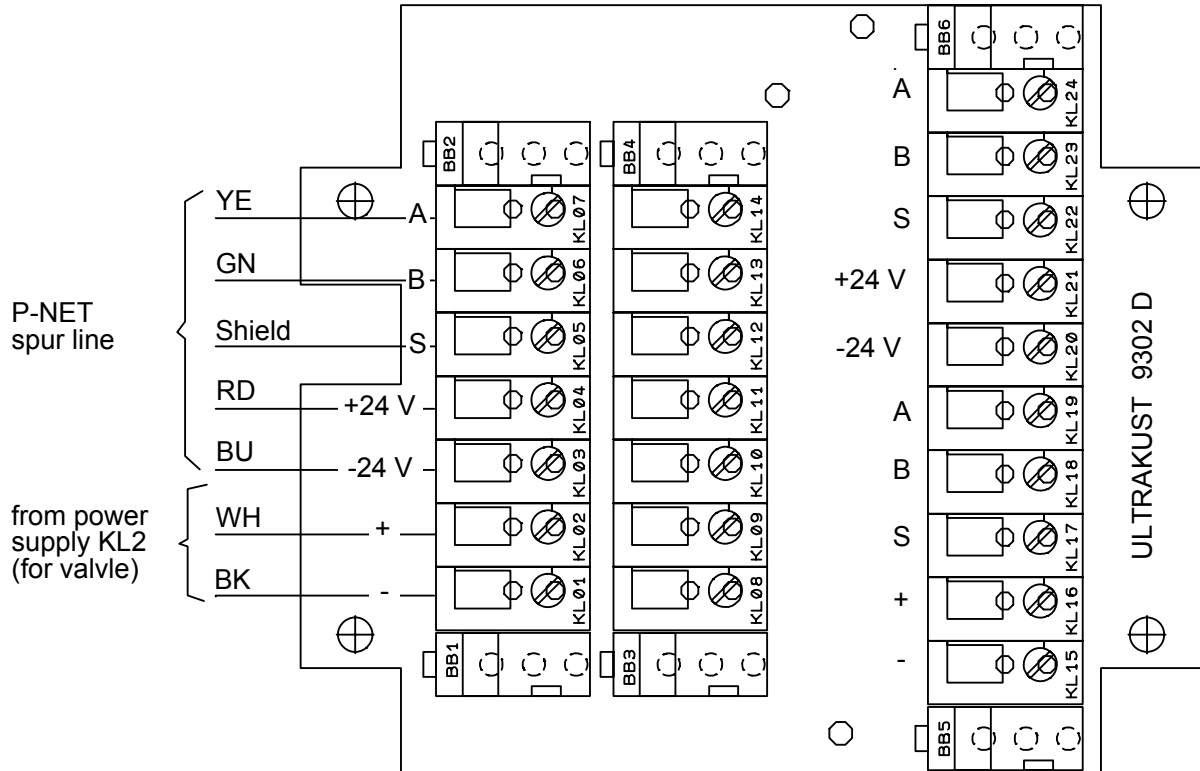
In other words, you have to connect on both sides the P-NET spur line (terminal KL3 - KL7) in the type 6789-300 terminal box (A, B, S, +24 V, GND). Terminal KL1 - KL2 is provided for the solenoid valve voltage supply.



Cable assignment

Connection cable with plug		Connection cable with socket	
Wire no.	Plug	Wire no.	Socket
1	PIN 1	1	PIN 1
2	PIN 2	2	PIN 2
3	PIN 3	3	PIN 3
-	-	-	-
-	-	-	-
-	-	-	-
12	PIN 12	12	PIN 12
13	GND	13	GND

Terminal board of the terminal box



4 Start-up

4.1 Procedure and notes

The PETRODAT 3002 operating manual forms part of these instructions. It is imperative to observe the points described in the manual.

To commission the system you should proceed as follows:

1. Before switching on the on-board voltage, make sure that the complete system is wired correctly.
2. Set all the parameters at the controller:
Follow the menu structure step by step. It is not absolutely necessary to keep to the same order but it is essential to process all the menu points! The various menus, their significance and their setting options are described in the operating manual in the chapter "Configuration". The following menu structure provides an overview of all the menu points and their assignment.

NOTES

When commissioning is completed successfully it is advisable to print out the parameters (for your vehicle documentation). The set configuration data can be saved on a SSM cartridge cassette for re-loading at any time (EEP menu).

IMPORTANT!

Once a unit (e. g. a printer) is used in System 3002 (new generation) it cannot be used in System 3001 until its address is re-programmed. At the moment this can be done only by BARTEC.

4.2 Slip printer test type 6881-1

The printer can be tested by an integrated self-test function to see whether it is in good working order. To do so, proceed as follows:

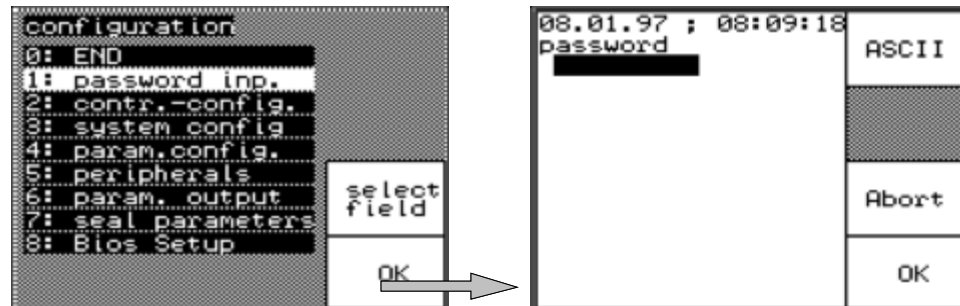
1. Connect the printer to the power supply.
2. Insert paper.
3. Press the button **[RELEASE]** and keep pressed for approx. 3 seconds, then press the button **[REVERSE]**.

Self-test print-out:

```
***** PAR.-Dump *****
Prombez.      TMV100.EPR
Date:         920617
Type:         6881-1
Device:       5812
Version:      1.00
Manuf. No.:   2
Manuf.:       ULTRAKUST Electronic
Serial No.:   92120251
Slave Addr.:  17

!"#$%&`()*+,-./0123456789:;<=>?@ABC
DEFGHIJKLMNOPQRSTUVWXYZÄÖÛ^_'abcdef
ghijklmnopqrstuvwxyzäöûß
```


4.3 Calculating and entering passwords



The software configuration function is protected by several passwords. The various passwords enable access to different configuration levels. The configuration level to which access is permitted is indicated after you have entered the password.

Driver password

The driver password permits access to configuration level 1. Here it is possible to change the system time and the language among the system parameters. The driver password is the sum of the day, month and hour (as shown in the main menu).

Driver password = Month + Day + Hour

Example:

Date: 03. 08. 1995, 09:20

Driver password = 3 + 8 + 9 = 20

User password

The user password is the vehicle fleet manager's password. It is formed using a three-digit code (user code) which the fleet manager can define himself. The user password permits access to configuration level 2. Here it is possible to activate and deactivate options and to configure hardware modules and program parameters that are not subject to statutory calibration.

User password = Driver password x (User code + 1) + User code

Example:

Driver password = 20, User code = 125

User password = 20 x 126 + 125 = 2645

Service password

The service password permits access to all the configuration options that are not subject to statutory calibration (configuration level 3). The service password is formed and changed periodically after each quarter of the year. The service password is revealed only to authorize service personnel.

BARTEC will inform you about the 4 service passwords for the next year at the end of each year.

Seal switch

All the configuration options are active (configuration level 4) when the seal switch is actuated. Data subject to statutory calibration can be changed only when the seal switch is actuated.

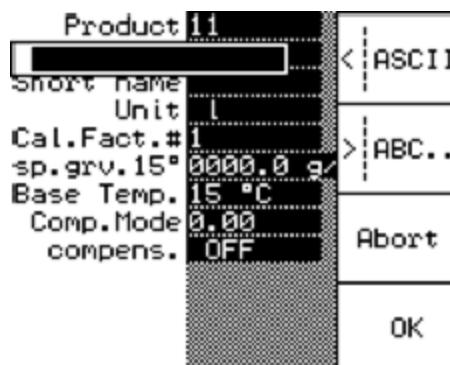
The following settings can be made without using a password:

- Contrast within the configured limits (Contr.-param./Contrast),
- Choice of slip language (Program param./Language select),
- Manual entry of additive price (Program param./Product data).

Text entries on controllers with a numerical keyboard

Controllers with a numerical keyboard have no letter keys. When text entries are necessary (for the customer's address, product name, product code and unit of quantity), they have to be made therefore in a different way.

Having selected a field requiring a text entry, you must first press any key (except those softkeys that are assigned a function) in order to call up the entry routine.



The two upper softkeys are given a dual function: in normal use they move the cursor to the left or to the right (represented in the display on the left-hand side of the two softkeys by the symbols < and >).

The second function is shown on the right-hand side of the softkeys (ASCII or ABC). To use the second function, press the softkey and the Shift key ([A]) simultaneously. Text can be entered in two different ways.

1. Text entry in ASCII

To enter a letter in the selected position, press the softkey ASCII ([] + [< | ASCII]) and enter the ASCII code for the required character. Then move the cursor to the next position (softkey [> | ABC]) and enter the next character in the same way.

The following table lists the ASCII codes of the most important characters. Characters shown in the display are not always output on the printer in exactly the same form. A printer's output depends on which character set is installed.

Character	Decimal code	Character	Decimal code	Character	Decimal code
Space	032	A	065	a	097
!	033	Ä	142	ä	132
"	034	B	066	b	098
#	035	C	067	c	099
\$	036	D	068	d	100
£	156	E	069	e	101
%	037	F	070	f	102
&	038	G	071	g	103
*	042	H	072	h	104
+	043	I	073	i	105
-	045	J	074	j	106
.	046	K	075	k	107
/	047	L	076	l	108
0	048	M	077	m	109
1	049	N	078	n	110
2	050	O	079	o	111
3	051	Ö	153	ö	148
4	052	P	080	p	112
5	053	Q	081	q	113
6	054	R	082	r	114
7	055	S	083	s	115
8	056	T	084	t	116
9	057	U	085	u	117
		Ü	154	ü	129
		V	086	v	118
		W	087	w	119
		X	088	x	120
		Y	089	y	121
		Z	090	z	122

Example:

Entering the product name "Oel":

1. Select the entry field with the [select field] softkey
2. Press any key (except active softkeys)
3. Press the [ASCII] softkey ([] + [< | ASCII])
4. Enter the ASCII code 079 for "O": []+[72] ; []+[94] ;[ready] softkey
5. Move cursor to next position: press [> |small] softkey
6. Enter the ASCII code 101 for "e": [61] ; []+[05] ; [61] ; [ready] softkey
7. Move cursor to next position: press [> |big] softkey
8. Enter the ASCII code 108 for "l" : [61] ; []+[05] ; []+[83] ; [ready] softkey
9. Press [OK] softkey

Entry of the word "Oel" is then complete.

2. Text entry by character selection

As an alternative to entering the ASCII code you can "scroll" through the characters with the [▬] key:

[▬] : forwards,
[Λ] + [▬] : backwards.

The [>|small] and [>|big] softkey is active when the cursor stands on a field that already contains a character. This enables you to change over between high case and low case for the displayed letter.

Example:

Entering the product name "Oel":

1. Select the entry field with the [select field] softkey
2. Press any key (except active softkeys)
3. Press the [ABC] softkey ([Λ] + [>| ABC]) → an "A" appears at the cursor position
4. Keep the [▬] key pressed until "O" appears at the cursor position (if necessary, use [Λ] + [▬] to scroll backwards)
5. Move the cursor to the next position: press the [>|small] softkey
6. Press the [ABC] softkey ([Λ] + [>| ABC]) → an "A" appears at the cursor position
7. Keep the [▬] key pressed until "E" appears at the cursor position
8. Change over to low case: press [Λ] + [>| small] → an "e" appears at the cursor position
9. Move the cursor to the next position: press the [>|big] softkey
10. Press the [ABC] softkey ([Λ] + [>| ABC]) → an "A" appears at the cursor position
11. Keep the [▬] pressed until "L" appears at the cursor position
12. Change over to low case: press [Λ] + [>| small] → an "l" appears at the cursor position
13. Press the [OK] softkey

Entry of the word "Oel" is then completed.

The [>| ABC] softkey is only active when no letter is entered at the cursor position. If there is already a letter at the cursor position, the softkey is assigned for [>| big] or [>| small].

You can start to "scroll" through the characters from any character.

Numerals and "." and "-" can be entered directly via the keys. To enter the numbers 6 to 0 and "-", press the Shift key ([A]) simultaneously.

Numbers are inserted at the cursor's standing position; if any other character is entered, it will overwrite the character already there.

Use the [DEL] key to delete the character standing to the left of the cursor.

4.4 Parameter print-out (example)

All the points are explained in detail in the operating manual. The parameter print-out varies from version to version.

```

param. output
15.04.03 07:38:50
FFB_B V118; 030414
seal modules
* DISPLAY      V101
* PRINT        V101
* T/M-Umw.     V102
* IMPULSG      V106
* Bios         V111
bios parameters:
  KB-Layout    big
  log. Port 1  PORT1
  Master Mode  STD-MASTER
  Master No    3   No of Master 5
  Wait Retries 20 No Answ.Reptr 5
  log. Port 2  DISABLE
  log. Port 3  DISABLE
  RS232-Port  DISABLE
contr.-config.:
Language select English
system config:
  data capt.   OFF invoice      OFF
  doub.meas.  OFF mult.del.    OFF
  sched.data  OFF * dyn.calib.  OFF
param. config.:
sequence param.:
  comp.totl   OFF
  unit=l      OFF
  slow flow   0 l
  flow limit  0 l/min
  prestop %   0.0%
  fuel break  10s
  show temp.  OFF
  driver      0
  vehicle     22
  dispenser   OFF
  airport     MUC
  truck reg.  ZH 123456
  contr.type  OFF
  big quant.  ON
  depot       0
  weight      ON
  debug       OFF
  perm.radio  ON
  ra.timeout  10s
  send error  OFF
tick.ctrl:
  Tax 1       0.00%
  Tax 2       0.00%
  currency    0
  prc-fact.   0
  tick.no.    0
  chin. bmp   OFF

line p.p.      0
rel.paper      ON
TE-journal     OFF
max. pos.      0
price pl.      OFF
pr.unplan.     OFF
gross pr.      OFF
pap.front      ON
foreign c.     0min
tdata-time    0min
* without *    OFF
day-buffer     10
Ext.Ticket     OFF
DELthenVEH    OFF
formular       3
ticket config.:
  tick.no.     ON   date       ON
  depot        ON   vehicle    ON
  PI No        ON   PIT-No     ON
  airport      ON   cus.name   ON
  custm.no.    ON   flight no  ON
  registr.     ON   aircr.type ON
  origin       ON   destinat.  ON
  prod.no      ON   product    ON
  Unit         ON   totl@beg   ON
  totl@end     ON   foreign c. ON
  start        ON   ord.receive ON
  end          ON   fuel.time  ON
  avg.temp.    ON   density    ON
  LF-start b   0    lf-bef.pos  0
  lf-betw.p.   0    lf-end pos  0
  horiz.off.   0    Qty.+Unit  OFF

productdata:
  main products:
  p unit s dens. bt cmod c a m g sh.n add
  -----
  * 8 | 1 1 801.0 15 0.00 0 0 0 0 J1 0
Jet A-1,
meter op.type:
  Vol-Cnt. 1  0
  Vol-Cnt. 2  0
dialog param.:
  cont.dlv.    ON
  pres.mand.   2
  rep.preset   OFF
  process id   OFF
  PIT choose   OFF
  auto.start   ON
  shift-pw     OFF
  order-pw     OFF
  radio ack.   OFF
  blanktest    OFF
  TGF          OFF
  no input     OFF

```

DEL_NO 5	OFF	auto.quit	OFF	
kg / litre	OFF	ID zero	ON	
FHSdensity	ON	Choose Country:		China:
France:				
* Modus F1	ON			
USA:		slip prt.	ticket-printer	
* Convert kg	0.0000	SerialNr.	96080685UE	
automatic	OFF	version	1.00	
fuel end	10s	Slave Adr.	65 \$41	
power off	0s	sealcountr	0	
fast boot	OFF	Output-Interf.		
pass.radio	ON	Olf.6718 1		
ext.fldata	ON	SerialNr.	01020320UE	
Switch off	OFF	version	1.06	
peripherals:		Slave Adr.	33 \$21	
vol-counter		sealcountr	1	
Vol-Cnt. 1		1=Outp.1	2=0	
* SerialNr.	01020320Ue	3=Outp.5	4=0	
version	2.75	controller serial number		
Slave Adr.	41 \$29	CPU :	95050078UE	
* sealcountr	68	POWER:	96080399UE	
* pulse/rev.	25			On-Time:
* Cal-Fac. 1	0.1000			764:40
* Cal-Fac. 2	1.0000			
* Cal-Fac. 3	1.0000			
* CounterNo.	1			
* chng.dir.	0			
3-channel				
Vol-Cnt. 2				
* SerialNr.	01020320Ue			
version	2.75			
Slave Adr.	41 \$29			
* sealcountr	68			
* pulse/rev.	25			
* Cal-Fac. 1	0.1000			
* Cal-Fac. 2	1.0000			
* Cal-Fac. 3	1.0000			
* CounterNo.	2			
* chng.dir.	1			
3-channel				
Temp-Sensor				
Te.-Sens.1				
* SerialNr.	01020320UE			
version	1.06			
Slave Adr.	33 \$21			
* sealcountr	1			
* R0	100.00			
* R50	119.40			
Te.-Sens.2				
* SerialNr.	01020320UE			
version	1.06			
Slave Adr.	33 \$21			
* sealcountr	1			
* R0	100.00			
* R50	119.40			
printer				

P	=	Product No.
E	=	Calibration factor No.
BT	=	Basic temperature (e. g. 15 °C)
KMod	=	Conversion method: 0.00
K	=	Compensation ON/OFF
A	=	Delivery of the product with additive
M	=	Assignment, measuring chamber during double delivery 0 both

A detailed description is to be found in the Chapter "Configuration" in the operating manual.

Explanation of points in the parameter print-out concerning statutory calibration

On the PETRO 3002, all those parameters marked in the parameter list with an asterisk * are interlocked with the external seal switch. There are 3 parameter groups involved:

1. Version numbers of those software modules that are subject to statutory calibration.
2. Conversion of quantity into kg specifically for Switzerland.
3. Conversion parameters and names of the individual products.
4. Serial numbers (A-No.) and the factors set for pulse counters / measuring chambers.
5. Serial numbers (A-No.) and the standard meters of the temperature probes.

Re 1.

The version numbers of those internal program modules of importance for calibration provide information about the revision status of the unit's internal software. The unit's internal software is created only by BARTEC. Detailed explanations are to be found in the Description of System 3002 Calibration, Section 3.2.11.

Re 2.

In Switzerland the quantity is output in kg. This operating mode is not permitted in Germany. The parameter has to be OFF. The parameter is protected by the seal switch.

Re 3.

The product data (conversion data, assigned calibration factors, etc.) have a direct influence on accuracy and prevent intentional misuse. These data are protected by the seal switch.

Re 4.

Pulse counter serial numbers, pulse counter data, the calibration factors of up to three product groups and the number of the measuring chamber or measuring point (counter number) are protected by the seal switch because they have a direct effect on accuracy. Since the controller is able to serve two measuring points simultaneously there are two sets of pulse counter or measuring element data.

Re 5.

The serial numbers of the temperature probes are protected by the seal switch (as a check to whether they are swapped). The standard meters indicate the calibration status of the temperature probes. The probes are calibrated in a water bath at the BARTEC factory. This is possible only by means of a secret, specially protected procedure. Each successful calibration (and of course any case of attempted manipulation) changes this standard meter, which is stored in the temperature probe. The controller reads out this standard meter and compares it with the value stored internally in the standard meter. Fault messages are issued if there is any deviation. These temperature probe parameters are protected by the seal switch.

Those parameters of importance for calibration are marked with an asterisk * in the parameter print-out in order to make it easier for the calibration officer to find them for checking. The important parameters are summarized in the menu Configuration/Seal parameters where they can be checked and changed if necessary.

5 Calibration

5.1 Calibrating PETRODAT 3002

It is important to observe the following points during calibration:

1. Check the parameter settings
 - This can be done in the menu 1:Configuration/7:Seal parameters. All the parameters of importance for calibration can be found here. A better option is to print out the parameter list (menu 1:Configuration/6:Print parameters), and to check the parameters on the list. Those parameters subject to statutory calibration are marked on the list with an asterisk.
2. Check the calibration factor settings (see also 1.)
 - In the case of new measuring chambers which have already been pre-tested with a pulse counter it is possible to adopt the pulse value (pulses/liter) directly from the rating plate as calibration factor.
 - In the case of retrofits, set calibration factor 1.0000 or 10.000 for the first measurement (this simplifies conversion). The calibration factors are calculated from the displayed quantity, the set-point quantity and the set calibration factor.

Calibration factor:

$$\frac{\text{Displayed quantity (uncompensated)} \times \text{set calibration factor}}{\text{Set-point quantity}}$$

Example:

1000 l are delivered during the measurement. The display shows a non-compensated quantity of 1153 l. The set calibration factor = 1.25

Calibration factor:

$$\frac{1153 \text{ l} \times 1,25}{1000}$$

$$= 1,4412$$

- Before you begin with the calibration, establish which of the 3 possible calibration factors are to apply for the various products.
3. When calibration is completed, move the seal switch on the bottom of the controller into horizontal position and seal it. It is imperative for the system to show the main display (ULTRAKUST at the top edge of the screen) when performing this operation. In the unprotected state (seal switch open) a large E flashes at the centre of the main display. When the seal switch is in horizontal position, this E disappears and the parameters that are subject to statutory calibration are locked. You can then check whether it is now impossible to change the calibration factor. When calibration is completed it has to be impossible to make a delivery. The seal switch is located at the bottom of the unit and is fitted with a calibration pin. This pin is secured with a calibration seal. This seal has to be broken and the calibration pin removed to activate the seal switch.

4. There is no need to add to the measurement system plate because the rating plate on the controller is permanently connected to the entire measurement system by the sealing process. The fixing screws for the controller base and the rating plate are protected simultaneously by this seal. Since approval is now issued only to the complete system, there is no longer any need to use the rating plate of the measuring chamber. All the data quoted there by the manufacturer remain valid.
5. The provisional test certificates supplied with the system should be collected and handed to the calibration officer.
6. Enter the unit numbers in the measurement system document.
7. Make a final parameter print-out and staple to the measurement system document.

5.2 Calibration-related instructions for servicing the PETRODAT 3002

Before beginning with the servicing work, print out the parameters - where possible - or make a record of the parameter settings by hand.

When the servicing is completed, re-check all the parameters against the previously made list of parameters and the parameter list attached to the measurement system document.

1. Devices with calibration markings are to be replaced only with pre-tested parts. These devices normally include temperature probes, printers and controllers (either complete or only a replacement top or base).
2. The repair engineer's mark may be applied only if the calibration term has not yet expired (indicated on the main stamp).
3. The repair engineer's mark has to be applied to the replaced or repaired part. If any security stamps are damaged (lead seals), the main stamp (Calibrated until) has to be cancelled as well and the repair engineer's stamp has to be applied. In each case the date has to be entered on the repair engineer's mark in waterproof ink.
4. Damaged lead seals have to be replaced with new ones and stamped with the repair engineer's mark. If the temperature probes, for example, are replaced in the PETRODAT system, a new seal wire with a new seal has to be fitted and stamped with a counter bearing. Every repair engineer has a metal stamp with him for this purpose.
5. The responsible calibration office has to be notified immediately that the repair engineer's stamp has been applied.
6. Every repair has to be recorded in the measurement system document (to be kept in the vehicle). The repair engineer has to describe the repair briefly in the space provided, enter letters identifying the unit in question, and enter the date and his name. The new unit A-No. must also be entered where necessary. The customer has to contact the Calibration Office in order to have the measurement system document countersigned. The repair engineer should instruct him accordingly.

7. When the top section of the controller is replaced there is usually no need to set any parameters. To be safe, however, it is **imperative** to check the parameters. The above points are then to be observed accordingly.
8. If the base of the controller is replaced, all the parameters have to re-entered. In this case the data on the list of parameters attached to the measurement system document or on the previously made print-out have to be entered with absolute accuracy. If a defect makes it impossible to read the parameters that are important for calibration, the repair engineer's mark is not to be applied when the work is completed. The vehicle has to be taken out of action and re-calibration performed immediately. It is the repair engineer's duty to notify the customer accordingly and to inform the responsible calibration office. This applies also if there is the slightest doubt in the system's measurement accuracy (for any other reasons).
9. The seal switch on the controller base has to be opened to replace the temperature probes. The A-No. has to be entered. The seal switch must then be re-closed and stamped in accordance with point 3. and 4. The parameters have to be checked.
10. The provisional test certificates accompanying any replacement parts used have to be handed over the customer's contact person and attached to the measurement system document.

6 Troubleshooting

6.1 General

If a P-NET error message appears (e. g. NO RESPONSE ...), the cause of this message can be:

1. The power voltage of the system is not correct (to low or not present).

Please check:

- Power voltage of the vehicle,
- input and output voltage of the BARTEC power supply (battery, ...),
- all cables and connections of each item.

2. A defective cable or wire (short cut, broken wire, ...)

Please check:

- Cable and wires of the item (power and data wires),
- disconnect the cable of each item and switch off the item in the controller, till the message is cleared.

3. The item (called in the message) is defective.
4. If the item is okay, the power supply board (inside the controller) is defective.

6.1.1 The main menu does not appear after switching on

If the main menu fails to appear on the controller after switching on (e. g. following an upload, replacement of the top section, commissioning, etc.), proceed as follows:

- If the monitor remains completely dark after switching on:

Check all the system's wiring and make sure that the ribbon cable is properly connected between the top section and the base.

- If the display shows the test menu but then stops:

1. Acknowledge all the error messages with [Abort] or [OK] until the main menu appears. If that fails, press the [DEL] key while the system is being booted in order to enter BIOS. Then proceed as described in point 2
****.

2. To erase the internal memory, proceed as follows:

```

Clear EEPROM:      Menu
Configuration
Bios
                ****
                1:Config
8:System Config
Time/Date/RAM
EEPROM clear
Quit
Clear RAM:         RAM clear
Quit
    
```

Wait for the main menu to appear after booting.

3. Disconnect the voltage for approx. 5 sec.
4. Acknowledge all error messages with [Abort] or [OK] until the main menu appears.
5. Set the language with the following combination of commands:

```

menu
1:configuration
2:contr.config
3:language select
2:English
End
    
```

Confirm until the main menu appears.

6. Continue the configuration as described in the operating instructions. The configuration will not be saved until you return to the main menu.
 - If the main menu fails to appear, you will also need to perform a program upload:

1. If the program needs to be re-loaded, connect up the cartridge shaft.
2. Switch on the voltage.
3. Switch off the calibration switch (set the switch in vertical position).

4. Acknowledge all error messages with [Abort] or [OK] until the main display appears. If this fails, press the [DEL] key while the system is being booted in order to enter BIOS. Then proceed as described in point 5

```

****
Sequence:         Menu
1:Configuration
8:Bios
                ****
                Prog.Load
    
```

*From cartridge
Quit*

Wait until the main display menu appears or until the first error message is shown.

5. Disconnect the voltage for approx. 5 sec.
6. Continue the configuration as described in the operating instructions. The configuration will not be saved until you return to the main menu.

6.1.2 Problems when activating a peripheral device (e. g. printer!)

To activate a device, you must actuate the corresponding **[ON]** in the **PERIPHERALS** menu and then enter the serial number (A.-No.). If any error messages appear while activating a particular device, ignore them for the time being. Activate all further devices (1st run).

If, after all the devices have been activated, you are still presented with any error messages (No Response or Wrong Serial No.), repeat the operation (2nd run). This entails deleting the A.-No. In question and entering it again. Everything should work after this 2nd run and there should be no more error messages.

If not, the device in question is defective or its wiring is not in order.

6.2 Software reset

6.2.1 Controller

If the controller stops and does not respond any more (as may happen with a PC), it can be booted again with a reset. A reset is followed by the test routines, after which the main menu appears. Error messages have to be acknowledged.

Note:

Resets are only possible when the calibration switch is off (vertical position).

On controller type 6732-10 and 6733-10 the following keys have to be pressed simultaneously:

Softkey **[1]** and **[4]** and **[SHIFT]**.

On controller type AN 6742-10 and 6743-10, the following keys have to be pressed simultaneously:

Softkey **[1]** and **[4]** and **[ALT]**.

7 Replacement of devices

The serial numbers (A.-No.) of all the devices are saved in the controller (Peripherals). If a device is defective and has to be replaced, you must enter the A.-No. of the new device. Basically the procedure is the same as during commissioning. The A.-No. of the defective device has to be deleted from the menu Configuration/Peripherals and the new A.-No. has to be entered.

Note:

All the calibration and configuration data is saved in EEPROMs in the base of the controller. Re-commissioning and re-calibration are necessary, therefore, if the base is replaced.

Example of how to replace a device: The printer on controller type 6743-10:

1. Switch off the system!
2. Disconnect the defective printer and take out of its bracket (undo the corresponding screws).
3. Mount the replacement printer and connect up.
4. The serial number of the replacement printer (A.-No. on the rating plate) must then be entered at the controller or it cannot be sent any commands.

Proceed as follows:

Switch on the system and acknowledge all error messages.
The main menu appears with 2 options:

TOUR BEGIN or **MENU** (Softkeys on the right side of the display)

Press:	MENU
Select the field:	1:CONFIGURATION
Confirm your selection:	OK
Select the field:	1:Password input
Confirm your selection:	OK
Enter the <i>USER PASSWORD</i> or the <i>SERVICE PASSWORD</i>	
Select the field:	PERIPHERALS
Confirm your selection:	OK
Select the field:	PRINTER
Confirm your selection:	OK

8 Software

8.1 Program uploads

This chapter describes the procedure for updating a program. The program is on a 1 MB cartridge that can be used only for this purpose. It is also important to note the instructions supplied with the cartridge on which the particular program is saved!

Proceed as follows:

- a) Insert the cartridge with the program in the HLK/SSM cartridge station.
- b) Switch on the system and acknowledge all the error messages. You are then presented with the main menu. Turn on the calibration switch: An E appears in the main menu (bottom left).
You have 2 options:

TOUR BEGIN or **MENU** (softkey to the right side of the display)

Press: **MENU**

IMPROTANT!

- First it is imperative to print out the parameter list (in the submenu "CONFIGURATION").
- In most cases there is no need to erase the EEPROM areas! Please read the instructions.

Select the field: **1:CONFIGURATION**
Confirm your selection: **OK**

Select the field: **7:BIOS SETUP**
Confirm your selection: **OK**

You are presented with the menu **BIOS SETUP.**

Press the softkey: **PROGR.LOAD**
A 2nd menu appears with 3 softkeys:

Press the softkey: **from HLK**

You will be given a message about the contents of the semiconductor cassette (program name, version etc.)

Then press the softkey: **QUIT**

The program loading routine now follows, beginning with the erasing of the old program. The entire operation takes approx. 5 minutes. The progress of the loading is indicated in percent. Finally, a check is carried out to see whether everything was transferred correctly. While this takes place, the display shows an hour-glass. After approx. 1 minute you are returned to the main menu, indicating that the loading has been completed successfully!

Note:

A number of error messages and warnings may appear on the main menu after the upload. They can be ignored and acknowledged with [OK].

It is particularly important to make sure that the voltage supply is not interrupted during an upload. Otherwise the upload routine will be disturbed and the controller will have to be re-programmed!

Erasing the EEPROM areas (if necessary):

Select the field: **CONFIGURATION**
Confirm your selection: **OK**

Select the field: **2:Contr.Parameter**
Confirm your selection: **OK**

Select the field: **4:Erase EEPROMs**
Confirm your selection: **OK**

You are shown the menu **Erase EEPROMs:**
All 3 EEPROM areas
CPU EEPROM
CALIB EEPROM
CONFIG EEPROM

are to be erased.

To erase, select the 1st field (CPU EEPROM) and press [OK].
You will then be asked again: **WARNING Erase EEPROM ?**
Confirm with: **YES**

Proceed in exactly the same way to erase the other 2 EEPROM areas!

When the 3 EEPROMs are erased, return to the main menu!

Finally press the softkey **MENU**

After completing the upload successfully you must re-enter all the configuration parameters in accordance with the parameter print-out (if the EEPROM areas were erased!).

8.2 BIOS setup

(see in the separate operating instructions "BIOS Setup System 3002" V 1.08)
