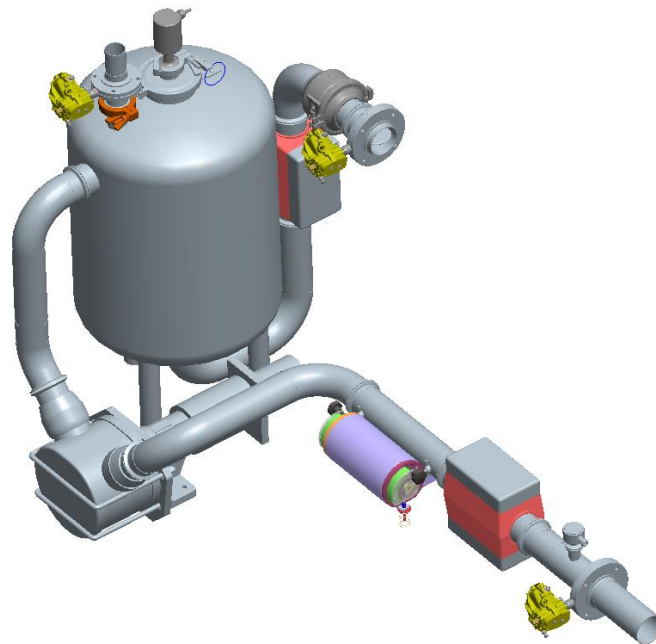


Measuring System MAK LYNX 3003

Service Manual



SA 150828

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Schulstraße 30
D-94239 Gotteszell

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Warranty

In principle, our "General Terms and Conditions of Sale and Delivery" apply.

These are available to the operator at the latest since conclusion of the contract.

Warranty and liability claims for personal injury and property damage are excluded if they are attributable to one or more of the following causes:

- ▶ Improper use of the product.
- ▶ Improper assembly, commissioning, operation and maintenance of the product.
- ▶ Failure to follow the instructions of the manual regarding transport, storage, assembly, commissioning, operation and maintenance.
- ▶ Arbitrary structural changes to the product.
- ▶ Poor monitoring of parts subject to wear.
- ▶ Improperly performed repairs.
- ▶ Disasters caused by foreign bodies and force majeure.

Consequential damages are generally excluded from liability.

EU-Declaration of conformity

We, BARTEC BENKE GmbH, Schulstraße 30, D-94239 Gotteszell, hereby declare, that this product is in compliance with the essential requirements of the relevant EU-Directives

The EU-Declaration of conformity for this product can be obtained from BARTEC BENKE GmbH, Schulstraße 30, D-94239 Gotteszell, gotteszell@bartec.com

Waste disposal

Make sure that the product described here is disposed of in an environmentally sound manner. Observe the national and local safety regulations.

1 About this manual

The illustrations in this manual are intended to illustrate the information and descriptions. They cannot always be transferred unchanged and may differ slightly from the actual design of the device.

BARTEC GmbH reserves the right to make technical changes at any time.

BARTEC GmbH is under no circumstances responsible or liable for any indirect or consequential damages resulting from the use, operation or application of this user manual.

Please read the operating instructions carefully before using the product.

Signs and symbol

The following characters and symbols are used in this manual to highlight passages that need special attention.



Notes

This arrow indicates special features to be observed during operation.



Warning

This symbol draws your attention to passages that, if not followed or followed inaccurately, may result in damage to or destruction of parts of the system or loss of data.



Danger!

This symbol marks passages that, if not followed, endanger the health or life of humans.

Special notes that appear within the text are marked with a frame.

2 Safety precautions

2.1 General safety instructions

The equipment operator is responsible for complying with all regulations applicable to storage, transport and handling.

For safe installation and commissioning, the knowledge of the safety instructions and warnings in this service manual and their strict compliance are essential.

Careful handling and consistent adherence to instructions can help to prevent accidents, injuries and property damage.

All regulations and provisions shall remain in full force when operating the equipment with MAK units.

The units were built in compliance with the applicable regulations and left the factory in perfect condition. The units must be installed and serviced by duly skilled and qualified personnel.

- Make sure that the information and operating conditions specified by the manufacturer are observed.
- Follow the instructions on operating and servicing the units.
- If you notice any damage or deterioration on parts of the equipment, or if safe operation cannot be guaranteed for other reasons, do not start up the equipment or - if it is already running - switch it off immediately.
Notify your service centre.
- You should also contact our service technicians if you notice malfunctions or defects during operation or if you have any doubts as to whether the units are working properly.
- The MAK units are not a replacement for the safety installations on the milk tanker or for the safety systems put in place by the customer.

2.2 Installation instructions

- Install the units as necessary in order to meet the ambient temperature specifications. Use enclosures, heating or cooling systems to protect them if necessary.
- The installation location should be as vibration-free as possible. Use sturdy retaining fixtures to protect all the components from vibrations.
- The printer must be installed in a permanently clean and dry location.
- **The power supply to the system must be stopped during welding work or assisted starting on the vehicle.**
- Take measures to keep the units clean during installation, especially the printer (e.g. protect from metal cuttings, etc.).
- Do not blank off unassigned cable glands.
- Remove the transportation lock from the printer before putting it into operation.
- All built-in solenoid valves must be shielded from interference (suppressor diode).

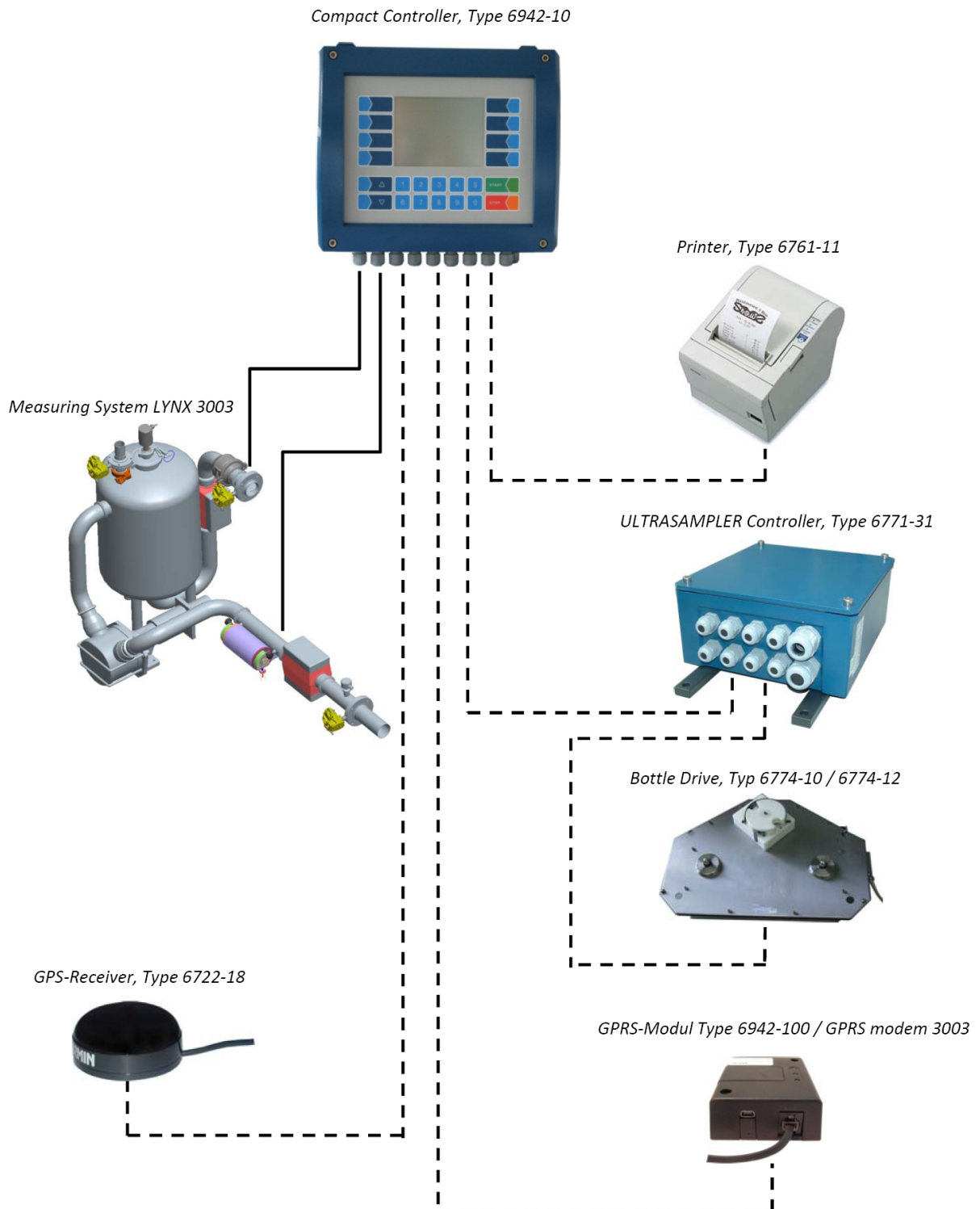
2.3 Wiring instructions

- The wiring must be undertaken by trained professionals.
- The installation must be carried out in accordance with the relevant national regulations.
- The unit must be wired with exclusive reference to, and in strict compliance with, the servicing instructions.
- The connection cables must be fitted in such a way as to eliminate any sagging. An allowance of approx. 15 - 20 cm is advisable for attachment with clips or cable ties. Extra care is needed when fitting the cables near the radiator, in the engine compartment, in parts of the truck frame and in the delivery cabin. Under no circumstances should there be any vulnerable points where the cables are kinked or susceptible to abrasion.
- Fit the cable ends with ferrules.
- Tighten the screws on non-assigned terminals.

2.4 Servicing and repair instructions

- Servicing and repairs must be carried out by trained professionals only.
- Switch the units off before servicing and repair work, and take measures to prevent them from being switched back on while servicing and repair work is in progress.

3 Block diagram measuring system MAK LYNX 3003



4 Compact Controller Type 6942-10

Order no.: 302428



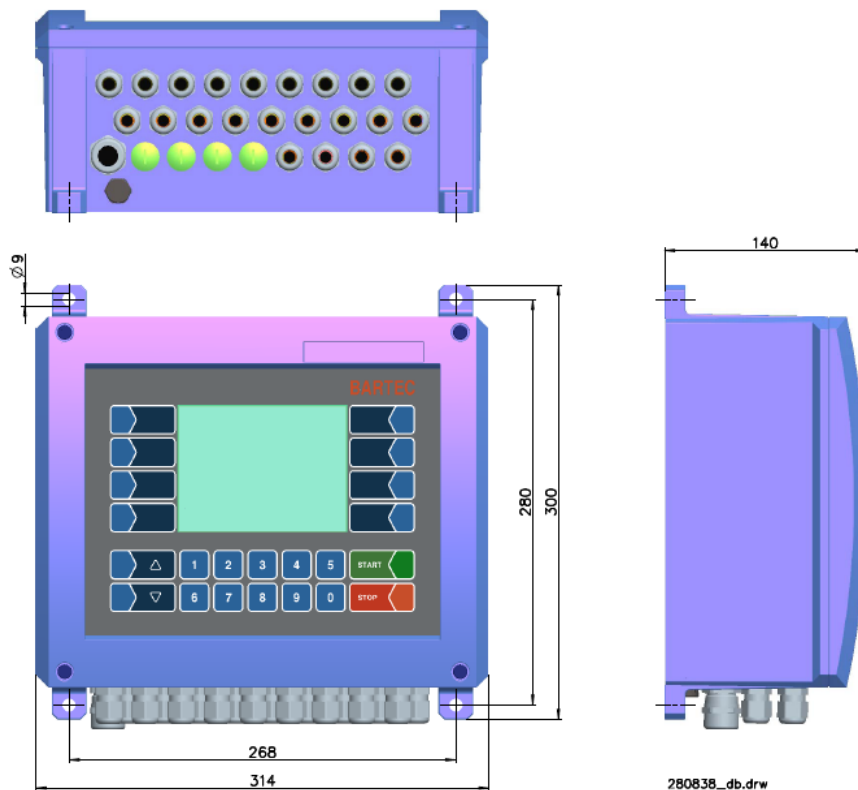
Attention:
"Fingers only" control

4.1 Technical data

Device-specific data	
Nominal operating temperature	23 ± 2 °C
Electrical data	
Operating voltage	DC 24 V (9 - 36V) on-board power supply (load-dump protection, stabilised)
CPU	
Processor	Power PC™ MPC8270 (266 MHz)
Built-in memory	FLASH: 256 MB FLASH (program memory) SDRAM: 128 MB SDRAM (working memory) SRAM: 4 MB (fail-safe data memory with battery backup)
Removable memory	CompactFlash: all sizes
Real-time clock	With battery backup
Display/keypad	
Display	LC graphic display, 120 x 89 mm, monochrome, transfective 320x240-pixel resolution, adjustable LED backlighting
Keypad	Resistive touch
Measuring system interface	
Power inputs	3 x DC 24 V, 0/4 - 20 mA
Voltage inputs	2 x DC 24 V, 0 - 4V 2 x DC 24 V, 0 - 4V
Temperature sensors	2 x Pt 100, 4-conductor
Pulse transmitter input	24V, stabilised, max. 1kHz
PWM output	24V, stabilised, max. 400Hz
Analogue output (opt)	0/4 - 20 mA, R _B max. 500 Ω, 10-bit, isolated
Outputs	16 x positive switching 1 A, 24 V, stabilised (3 A total)
Digital inputs	8 x optoisolated, input resistance 2.6 kΩ, bipolar, solid state
Pulse counter	3-channel max. 100Imp/s, input optoisolated 5 kΩ pull-up

Interfaces	
Printer interface	RS 232, RxD, TxD, CTS, RTS 115 K, isolated
Fieldbus interface	P-NET RS485, 76800 baud, isolated
Other interfaces	RS485, Ethernet 100 Mbit (on CPU), RS232 (excl. handshake)
Ambient conditions	
Operating temperature	- 20 ... + 50 °C
Storage temperature	- 25 ... + 60 °C
Climatic category	ISF in acc. with DIN 40050
Protection class	IP 65 in acc. with DIN 40040
Mechanical data	
Dimensions	See scale drawing
Material	Die-cast aluminium, blue coated
Front film	PES
Weight	65 N (6.5 kg)

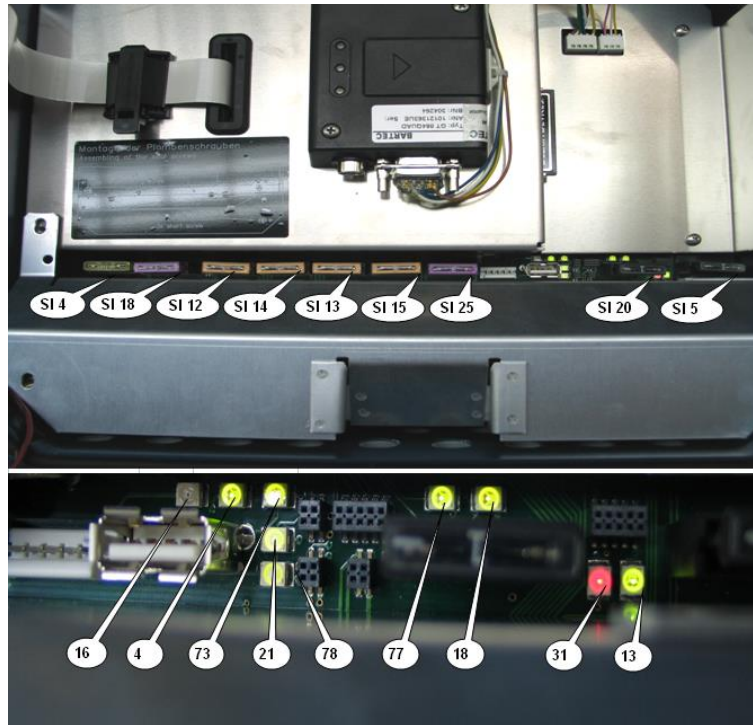
4.2 Dimensions Compact Controller



4.3 Blade-type fuses and LED displays on LYNX 3003 (on motherboard)

Motherboard without CAN-Bus

4.3.1



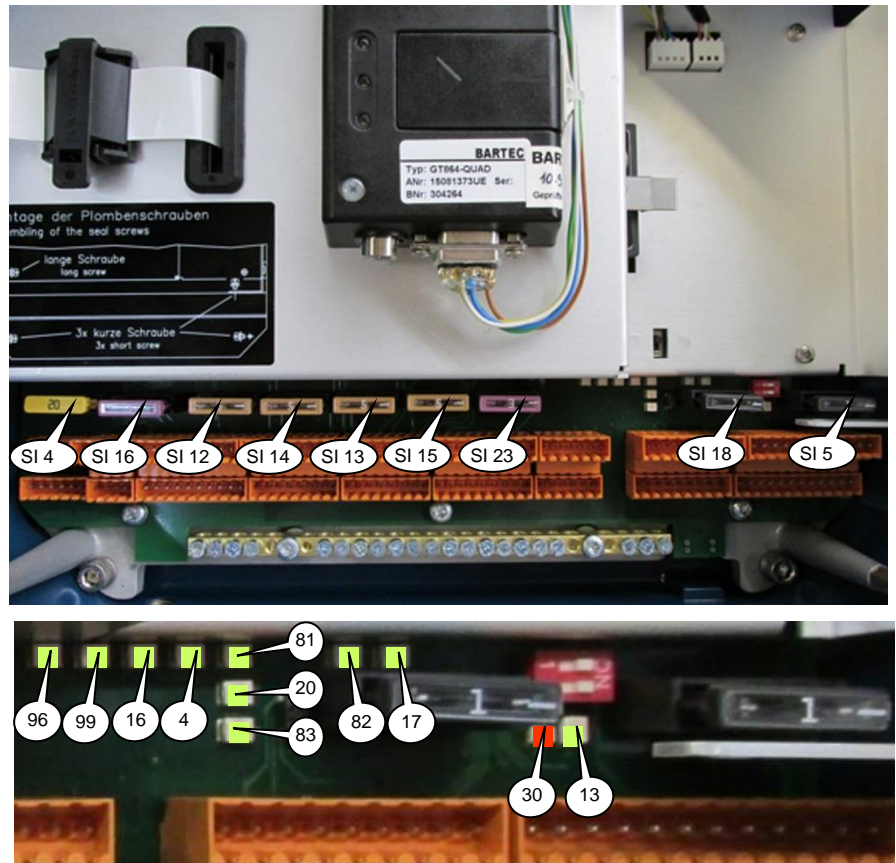
Standard blade-type motor vehicle fuses are fitted here with the following ratings:

Fuse no.	Rating	Voltage	Circuit/comments
SI 4	20 A	24V_S	Backup fuse for selective circuits SI18, SI12, SI13, SI14, SI15, SI25, SI5
SI 5	1 A	24V_0	4-20mA inputs; empty signal sensor; voltage inputs; turbine; FGS
SI 12	5 A	+UB_1-4	Supply outputs 1-4; terminals 14-21
SI 13	5 A	+UB_5-8	Supply outputs 5-8; terminals 22-29
SI 14	5 A	+UB_9-12	Supply outputs 9-12; terminals 76-83
SI 15	5 A	+UB_13-16	Supply outputs 13-16; terminals 84-91
SI 18	3 A	24V_COM	RS 485, GPS, printer, P-Net
SI 20	1 A	24V_GPRS	Supply for GPRS modem
SI 25	3 A	PWM out	Control of rotary pump, terminals 92-93

LED displays		Status	
LED 4	5.5 supply for CPU, motherboard, electronic measuring equipment	Lights up	
LED 13	Supply voltage 24 V_O/12 V_I analogue inputs	Lights up	
LED 16	µ Controller power supply "busy"	Flashes	
LED 18	USB communication, digital IN, analogue IO	Flashes	
LED 21	µ Controller k_mif "busy" (PT100, 4-20 mA, U_IN,...)	Lights up	
LED 31	µ Controller pulse counter "busy"	Lights up	
LED 73	USB hub for GPRS, USB socket, P-Net	Lights up	
LED 77	USB communication, P-Net, digital outputs	Flashes	
LED 78	µ Controller k_pio "busy" (P-Net, digital outputs)	Flashes	
LED CPU	Top	Supply voltage	Lights up
LED CPU	Bottom	Busy	Flashes

Motherboard with CAN-Bus

4.3.2



Standard blade-type motor vehicle fuses are fitted here with the following ratings:

Fuse no.	Rating	Voltage	Circuit/comments
SI 4	20 A	24V_S	Backup fuse for selective circuits SI16, SI12, SI13, SI14, SI15, SI23, SI5
SI 5	1 A	24V_0	4-20mA inputs; voltage inputs; pressure sensors; bubble sensors; dipstick
SI 12	5 A	+UB_1-4	Supply outputs 1-4; terminals 14-21
SI 13	5 A	+UB_5-8	Supply outputs 5-8; terminals 22-29
SI 14	5 A	+UB_9-12	Supply outputs 9-12; terminals 76-83
SI 15	5 A	+UB_13-16	Supply outputs 13-16; terminals 84-91
SI 16	3 A	24V_COM	RS 485, GPS, printer, P-Net, RS 232, CAN-Bus
SI 18	1 A	24V_GPRS	Supply for GPRS modem
SI 23	3 A	PWM out	Control of rotary pump, terminals 92-93
LED displays			Status
LED 4	5.5 supply for CPU, motherboard, electronic measuring equipment		Lights up
LED 13	Supply voltage 24 V_O/12 V_I analogue inputs		Lights up
LED 16	µ Controller power supply "busy"		Flashes
LED 17	USB communication, digital IN, analogue IO		Flashes
LED 20	µ Controller k_mif "busy" (PT100, 4-20 mA, U_IN,...)		Lights up
LED 30	µ Controller pulse counter "busy"		Lights up
LED 81	USB hub for GPRS, P-Net, CAN, display		Lights up
LED 82	USB communication, P-Net, digital outputs		Flashes
LED 83	µ Controller k_pio "busy" (P-Net, digital outputs)		Flashes
LED 96	USB-Communication CAN		Flashes
LED 99	µ Controller KCAN		Flashes
LED CPU	Top	Supply voltage	Lights up
LED CPU	Bottom	Busy	Flashes

Compact Flash card

4.3.3



Direction CF



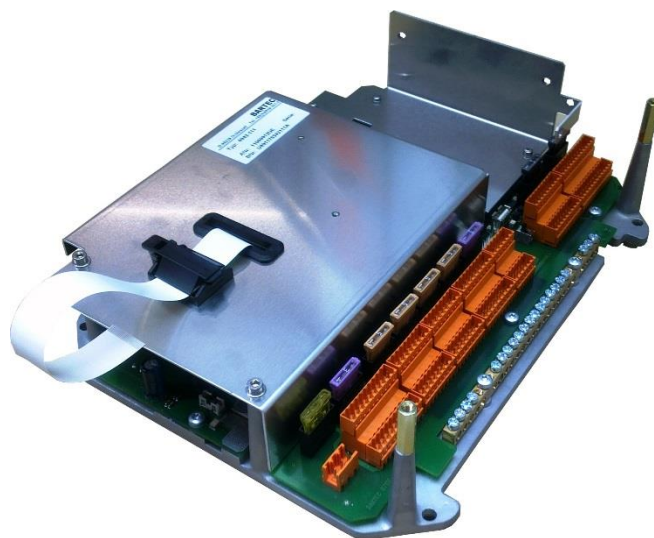
Attention:

Make sure the equipment is currentless before changing the Compact Flash card!

4.4 Exchanging the motherboard/CPU board

Type 6942-111 (without CAN-Bus), Order no.: U891176942111A

Type 6942-112 (with CAN-Bus), Order no.: U891176942112A



The following points must be noted when replacing the motherboard:

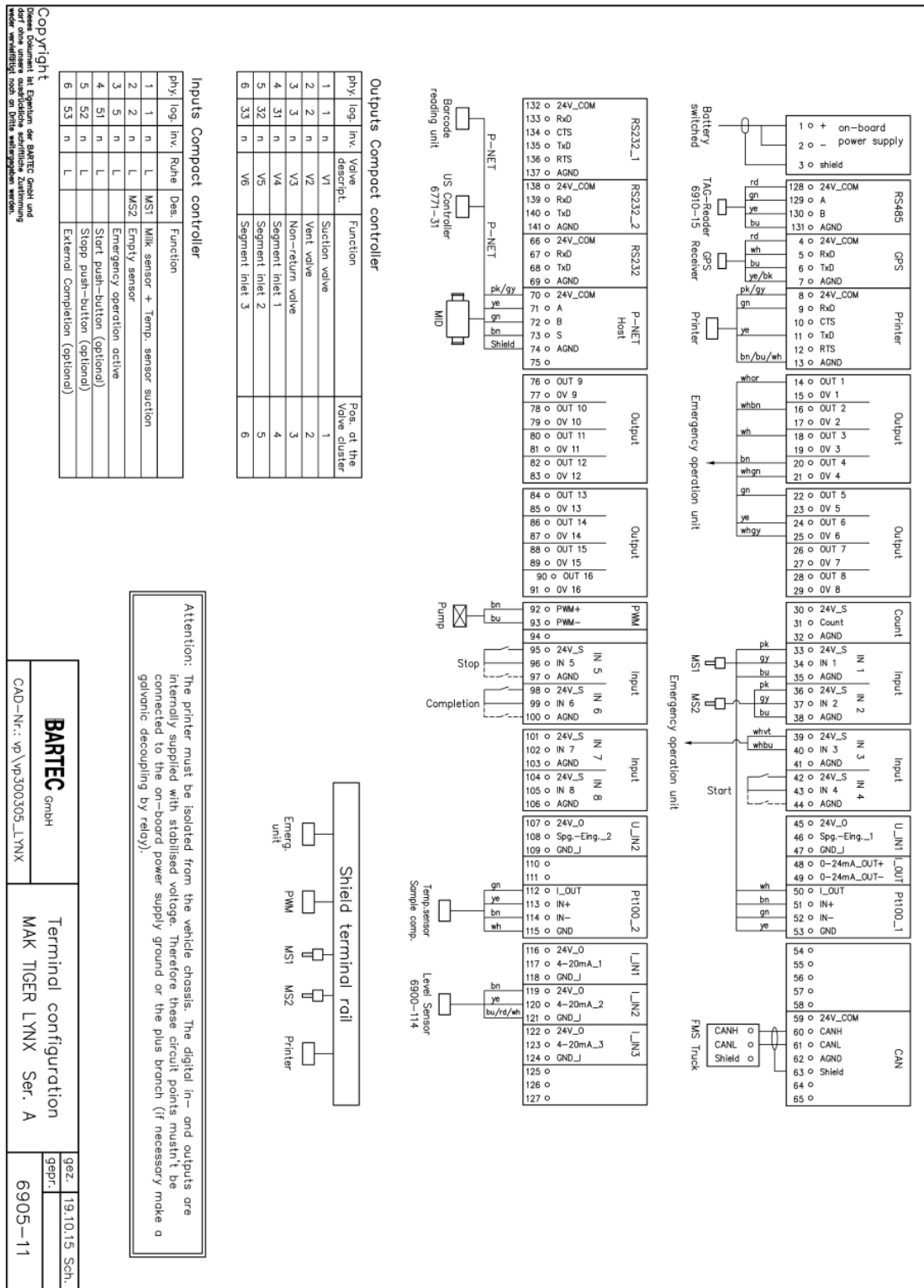
- The configuration can be transferred with the CompactFlash card. The configuration must first be saved on the CompactFlash card via the Service menu, then the configuration can be loaded from the CompactFlash card onto the new motherboard. Only if the calibration switch is closed will the calibration parameters not be loaded and will then have to be adjusted.
- To change the motherboard, the display must be unplugged (flip strip at end of ribbon cable), the terminal blocks disconnected, and the wires disconnected from the shield bar. The entire motherboard can now be unscrewed at all four corners (M6x12) and taken out.
- Apply heat transfer compound supplied with new motherboard and fit.



Attention:

If it is necessary to remove the cover - in order, for example, to check that the ribbon cable is in the correct position for the display - it is essential to remove the CompactFlash card first.

4.5 Compact Controller wiring



Note:

Note: Connections to external sources of voltage must be isolated. Plus and minus connections are required at each output.

Power supply


Attention:

Shielded 2.5 mm² cable (16 A fuse, earth and positive branch) is required for the 24 V power supply, including corresponding switch

4.5.1

The solenoid valves, all the measuring sensors and the ticket printer are supplied by the Controller (see general diagram on page **Fehler! Textmarke nicht definiert.**).

Inputs

The inputs are user-configurable. The following assignment is recommended:

log.	inv.	Quiescent state	Designation	Function
1	n	L	MS1	Milk sensor + temperature intake
2	n	L	MS2	Milk sensor MID
5	n	L		Standby operation on
51	n	L		Start button (optional)
52	n	L		Stop button (optional)
53	n	L		Completion externally (optional)

Outputs

4.5.3

The outputs are user-configurable. The following assignment is recommended:

log.	inv.	Valve designation	Function	Pos. in valve terminal
1	1	V1	Intake valve	1
2	2	V2	Vent valve	2
3	3	V3	Shut-off valve	3
4	4	V4	Segment feed 1	4
5	5	V5	Segment feed 2	5
6	6	V6	Segment feed 3	6

CAN bus termination (terminal resistor) (Series C)

The CAN bus line must be terminated at both ends. Using DIP switches (see picture below), the CAN bus termination/the terminating resistor on the compact controller can be switched on and switched off.

4.5.4



CAN bus termination deactivated or terminating resistors switched off.



CAN bus termination activated or terminating resistors switched on.



Attention:

CAN bus line:

It should be used a bus line which is isolated twisted and compliant to the CAN system (e.g. UNITRONIC BUS CAN 1x2x0.5 mm²).

CAN bus shielding:

The shield of the CAN bus line must be connected at one side.

CAN bus termination at FMS connection:

Via the DIP switch the CAN bus line must be terminated on the compact controller

4.5.5 Serial interfaces

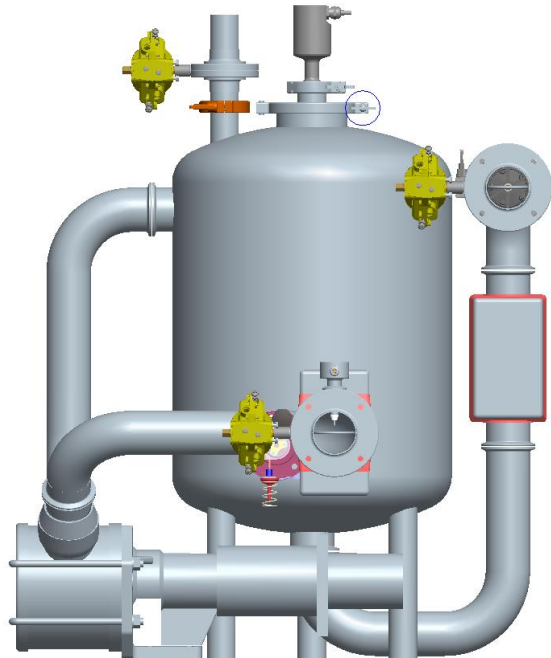
4.5.5.1 Motherboard without CAN-Bus

Designation	Terminals	Interface on the system
GPRS	White plug	dev/usb/ttyUSB0
Bluetooth	Display connector	dev/usb/ttyUSB1
GPS	4-7	dev/ttyS3 (not changeable)
Printer	8-13	dev/ttySM0
RS485/RS232	66-69	dev/ttyS4

4.5.5.2 Motherboard with CAN-Bus

Designation	Terminals	Interface on the system
GPRS	White plug	dev/usb/ttyUSB0
Bluetooth	Display connector	dev/usb/ttyUSB1
GPS	4-7	dev/ttyS3 (not changeable)
Printer	8-13	dev/ttySM0
RS232	66-69	dev/ttyS4
RS485	128-131	dev/ttyS2
RS232_1	132-137	dev/ttySM1
RS232_2	138-141	dev/ttyS5

5 Measuring system MAK LYNX 3003



5.1 Introduction

The MAK LYNX® measurement system for milk collection trucks is designed for mobile use during the collection of milk.

It's a self-priming measurement system working even under the worst conditions.

It is only possible to use this new technology in an optimal way, however, if certain boundary conditions are observed for the construction of the tank truck, which means that the designer of the tank truck has a decisive influence on the result.

5.2 Piping

The measurement system MAK LYNX has an inlet and an outlet with 2.5" connections.

The remaining equipment is furnished by the superstructure builder for the tank trucks. These additional superstructures have a significant influence on the performance of the milk collection truck.

Please note:

If possible, avoid any:

- changes in cross-section
- abrupt bows
- rectangular pipe outlets
- T-pieces
- inwardly protruding welding seams
- rough inside walls of pipes
- fittings protruding into the pipe
- everything that swirls the flow
- everything that impairs the flow

Particularly on the suction side, the piping system including the sampler and the flowmeter has to be carried out continuously in min. 2.5" to prevent pressure drops.

To maximize the pump performance, the plumbing for the tank outlets and the tap should have a diameter of at least 2.5". The adoption valve used by BARTEC BENKE corresponds to 2.5" in accordance with DIN 11850.

For the construction of the measurement system, it is of particular importance that the components of the measurement system are installed in a tension-free way. One possibility is to uncouple the pipework at suitable places by means of hose connections. If the components of the measurement system are fastened to different reference systems, these components have to be mounted by means of flexible fastening elements (e.g. rubber dampers).

5.3 System requirements

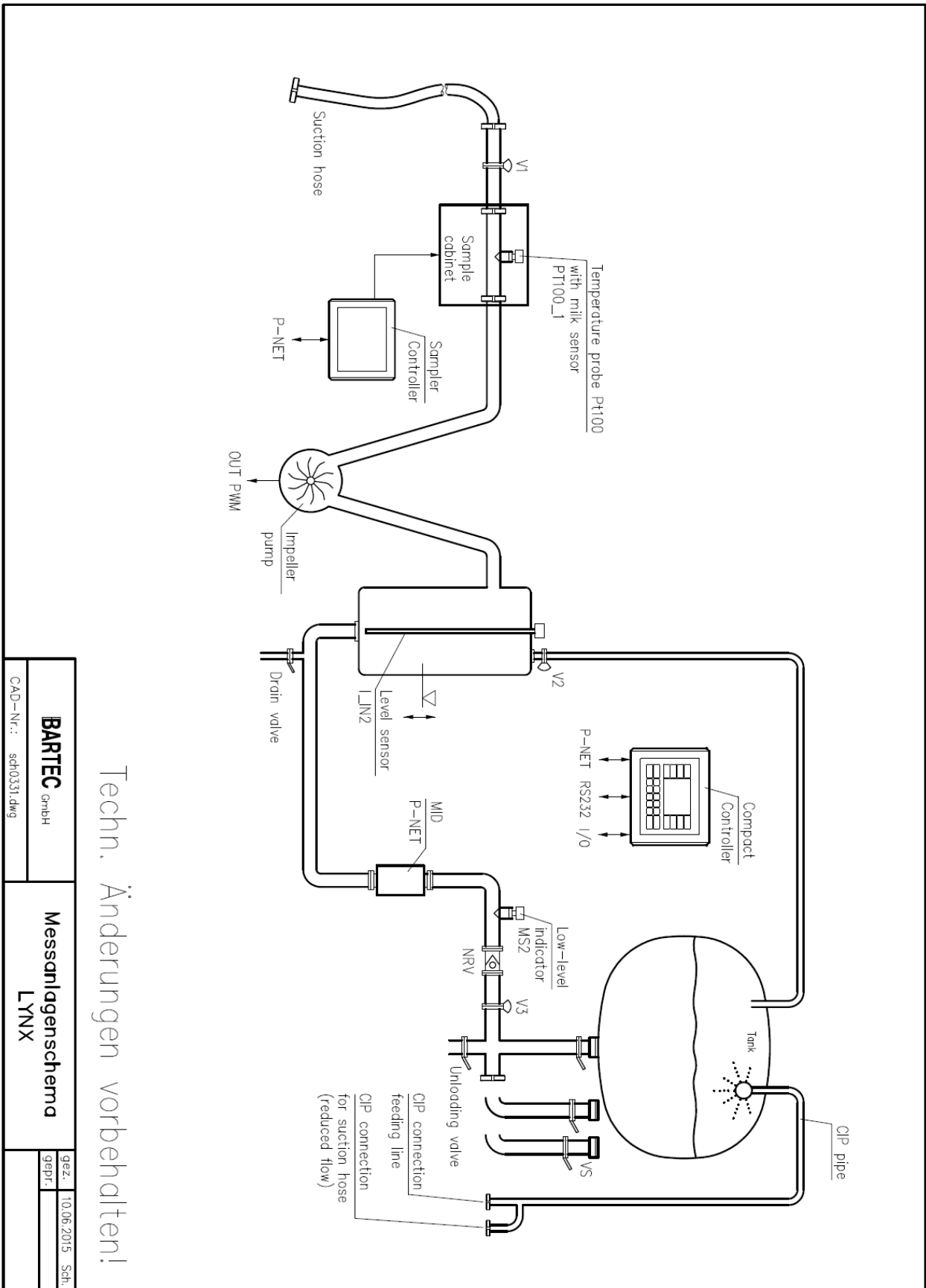
For an optimal functionality of the measurement system MAK LYNX, especially the following boundary parameters have to be observed for the construction of the milk collection truck:

- Hydraulic oil supply with at least 20 l/min, 200 bar, recommended oil HLP46 DIN 51524 T2, install oil filter with 10 my.
- A suitably sized oil cooler and oil filter should be provided for the hydraulic oil.
- The pneumatic supply must be designed for 100 nl/min. The oils and antifreeze agents used in the pneumatic system (incl. compressor) must be safe for use in food production processes.
- For the electronic components, a power supply line with a cross-section of 2,5 mm² must be laid. At least one for the Compact controller, one for the Sampler controller and one for the Emergency unit. The operating voltage should be 24 Volt. For 12-volt systems, a suitable voltage converter has to be inserted.
- By means of a main switch, an all-pole separation of the electronic components from the supply voltage has to be provided.
- In cold weather, the measurement system cubicle has to be heated.

5.4 Technical data

Measuring system-specific data	
Operating voltage	DC 24 V (9 - 36V) on-board power supply (load dump fixed, stabilized)
Emergency operation	On-board power supply 24 V (valves)
Valve terminal	6 bar (maintenance unit)
Suction power	max. 500 l/min during intake, max. 500 l/min during pumping over
Drive	Hydraulic motor 16,8 cm ³
Flow rate of hydraulic oil	about 25 l/min @ 200 bar
Speed	about 1400 revs/min
Hydraulic connection	> 16 mm
Hydraulic fluid	> 60 l with oil cooler
Connections	2,5" Clamp, Purge line DN 40
Precision	≤ 0,5 %
Lowest intake quantity	50 l
CIP	yes; \mathcal{G} max. 85 °C @ 2 bar
Mechanical data	
Material of milk conduit	V ₂ A; PTFE; PEEK, POM
Dimensions	See dimensional drawing
Weight	approx. 230 kg
Ambient conditions	
Operating temperature	0 ... + 85 °C medium; - 20 ... + 50 °C electronics
Storage temperature	- 20 ... + 60 °C (without fluid)
Protection type	IP 65

5.5 Piping diagram



Techn. Änderungen vorbehalten!

BARTEC GmbH		Messanlagenschema	
CAD-Nr.: sch0331.dwg		LYNX	
gez.	10.06.2015	Sch.	
gepr.			

5.6 Structure of the measurement system

Basically, all LYNX measurement systems have the same structure (modular). They only differ slightly in the arrangement of the inlets and outlets. The arrangement and design of the purge line can be varied according to customer requirements. The purge line is not included in the delivery scope of the LYNX.

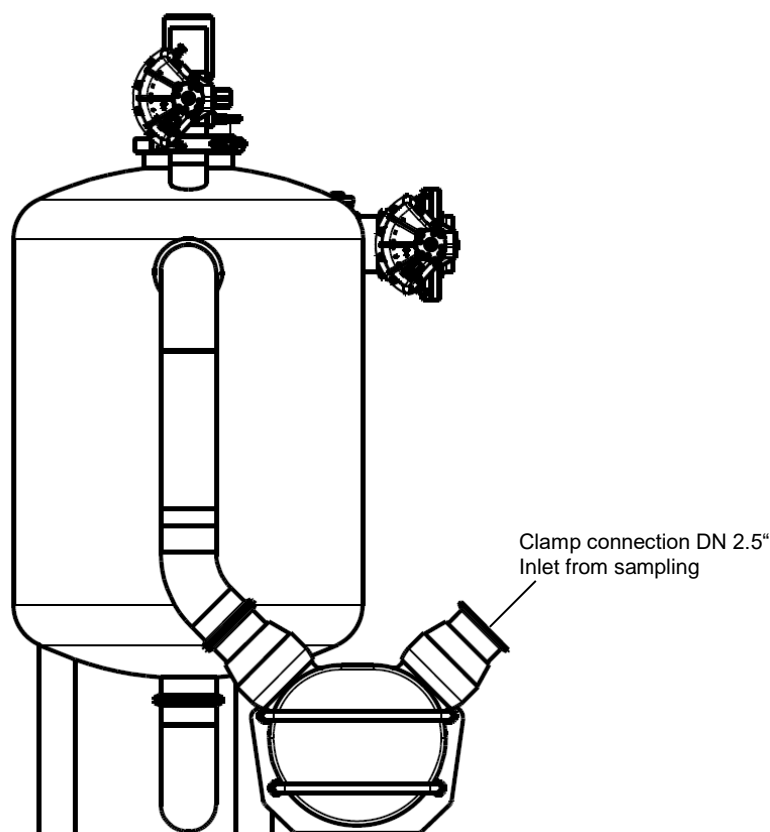
When designing the purge line, make sure it can be cleaned in place (CIP).

It is important that the air separator is drained automatically under all angles that the truck adopts during intake; for this purpose, it is mounted accordingly.

The hydraulic block and the coupling housing of the pump have to be protected against milk or CIP fluid leaking out from the tap by means of a suitable protective cover. The pump and the air separator have to be mounted in a tension-free and vibration-damped way.

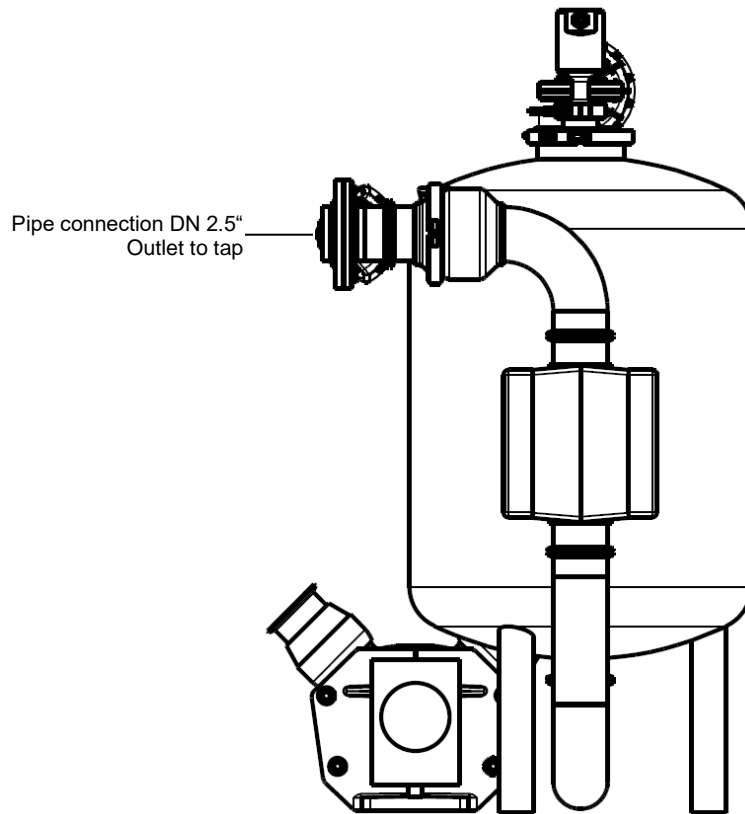
Measurement system basic set front view

5.6.1



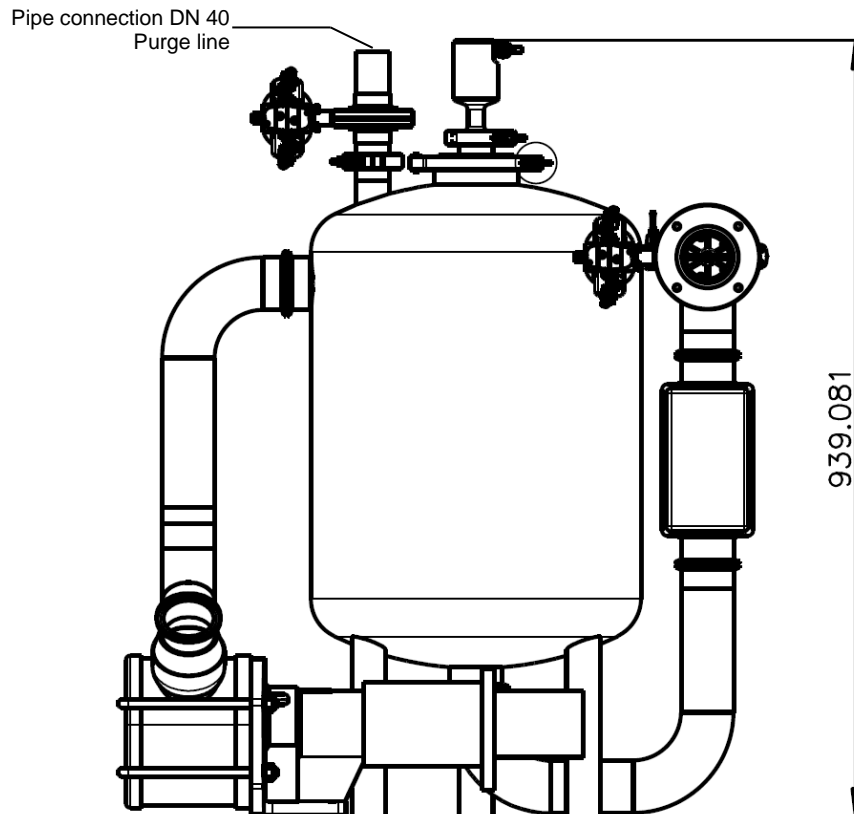
Measurement system, basic set, rear view

5.6.2



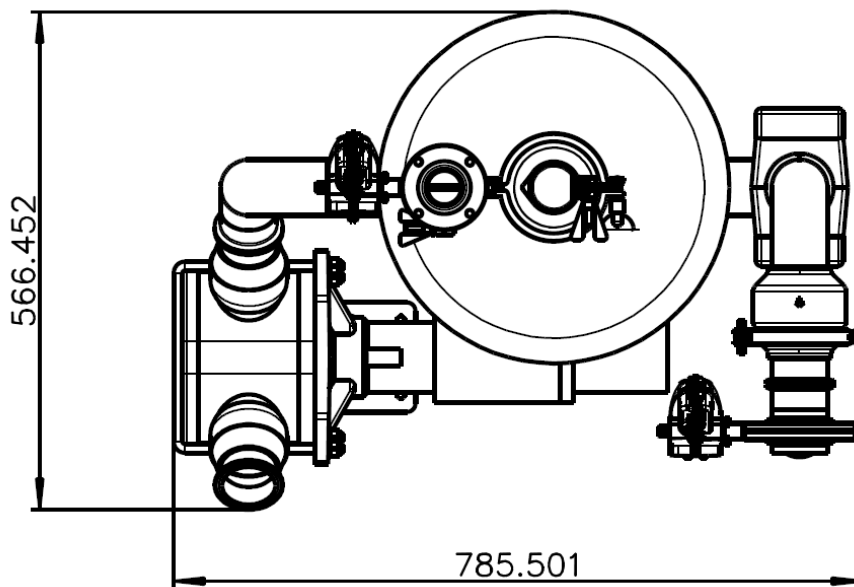
5.6.3

Measurement system, basic set, side view

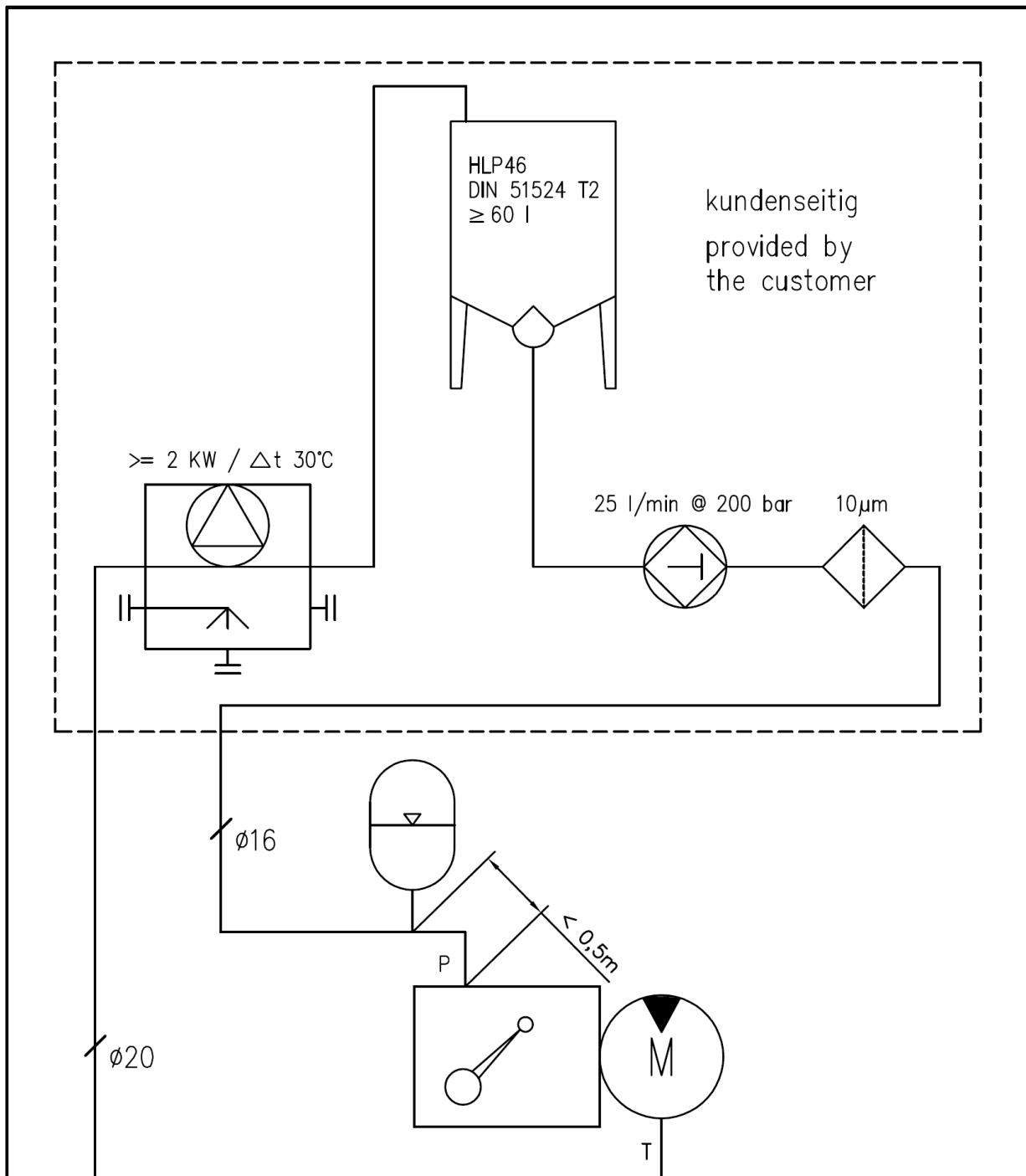


Measurement system, basic set, top view

5.6.4



5.7 Overview of the hydraulic

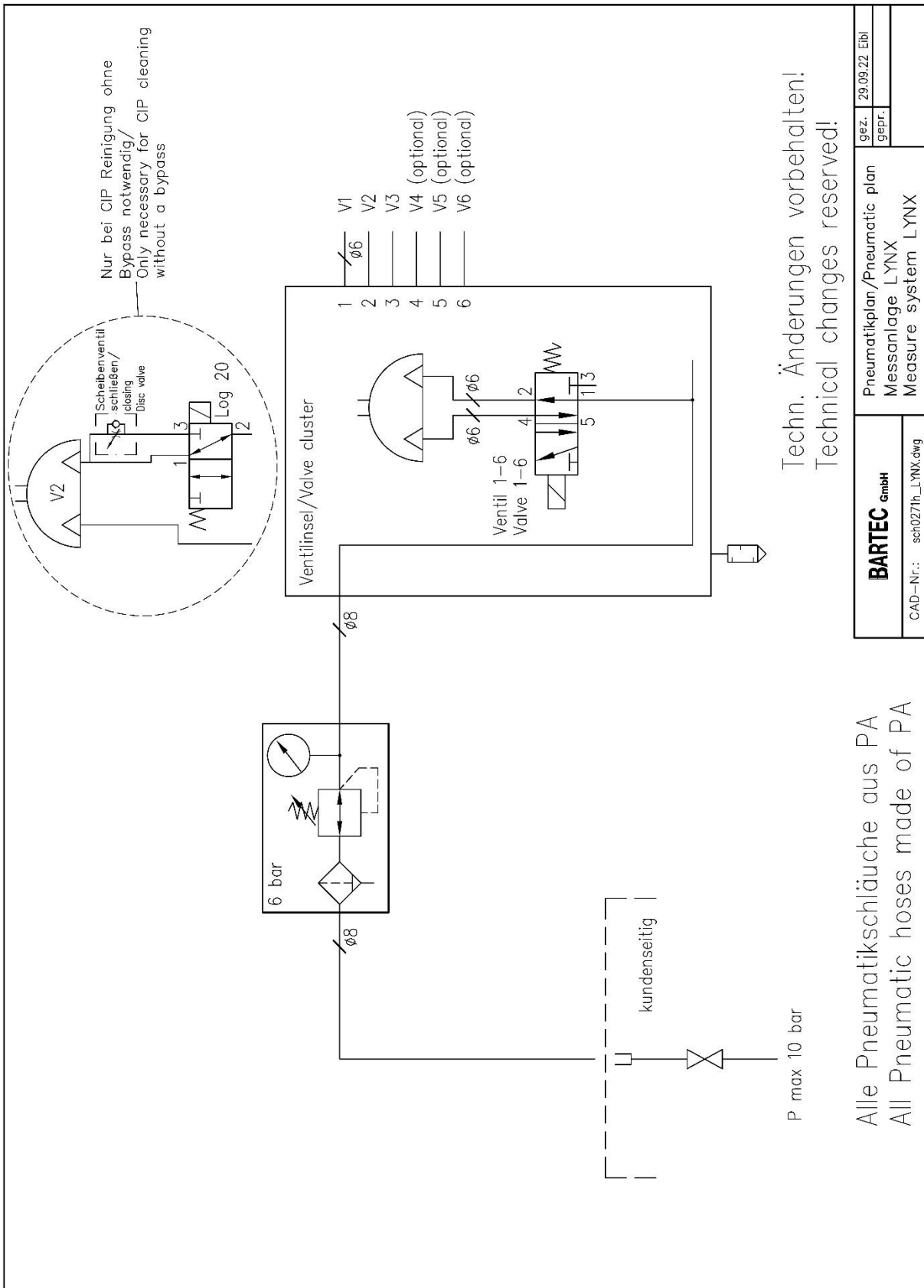


Techn. Änderungen vorbehalten!
 Technical changes reserved!

BARTEC GmbH	Hydraulikplan/Hydraulic plan		gez.	17.08.15	Sch.
	Messanlage LYNX		gepr.		
CAD-Nr.: sch0271h_LYNX.dwg		Measure system LYNX			

5.8 Pneumatic plan

BARTEC BENKE delivery scope



Techn. Änderungen vorbehalten!
 Technical changes reserved!

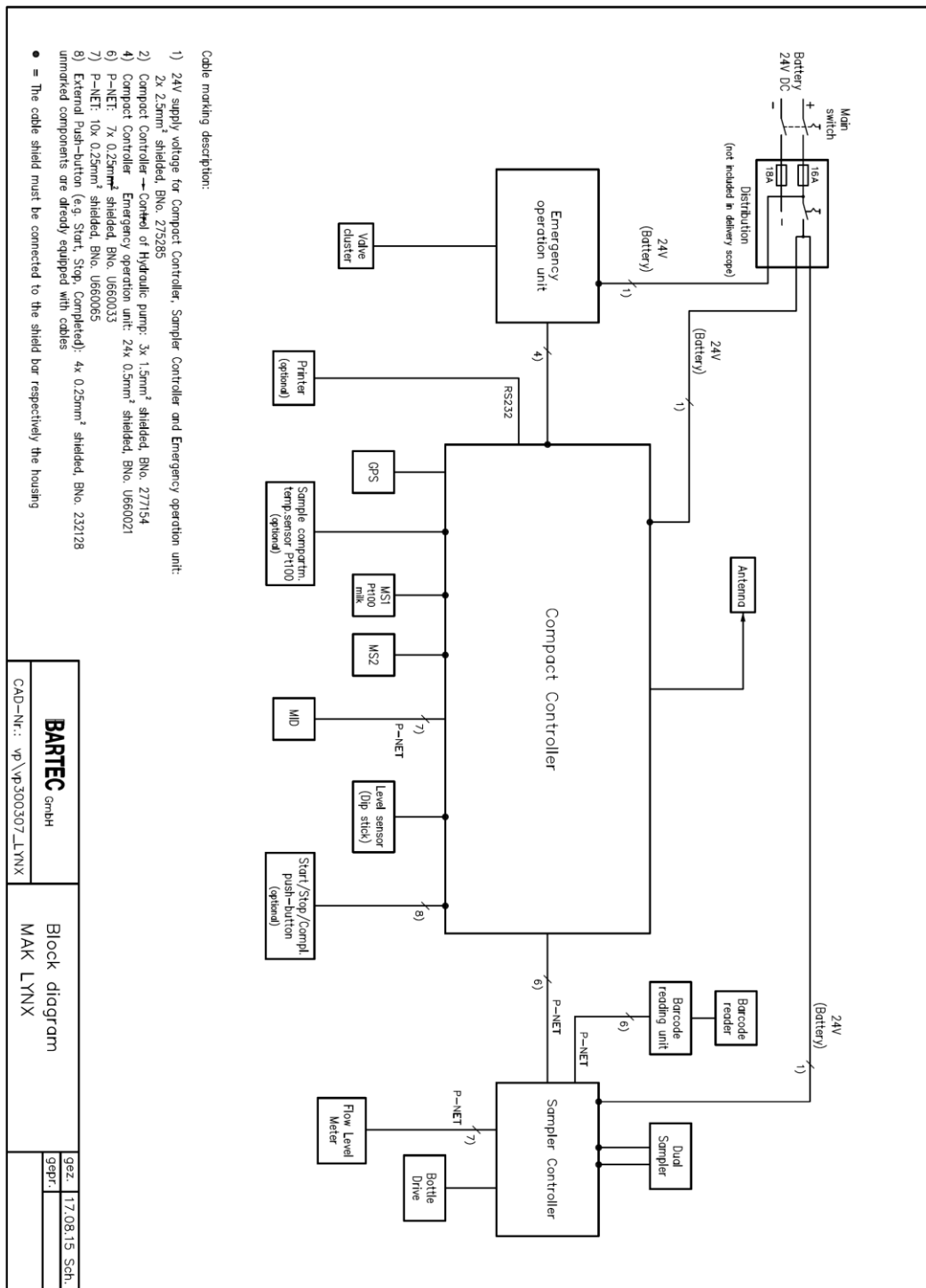
Alle Pneumatikschläuche aus PA
 All Pneumatic hoses made of PA

BARTEC GmbH	Pneumatikplan/Pneumatic plan	
	Messanlage LYNX	
CAD-Nr.: sch0271h_LYNX.dwg	Measure system LYNX	
	gez.	29.09.22 Eibl
	gepr.	

5.9 Electrical installation

Overview diagram

5.9.1



Attention:
Mount GPS and modem antenna at the highest point of the truck, without any re-reception interferences.

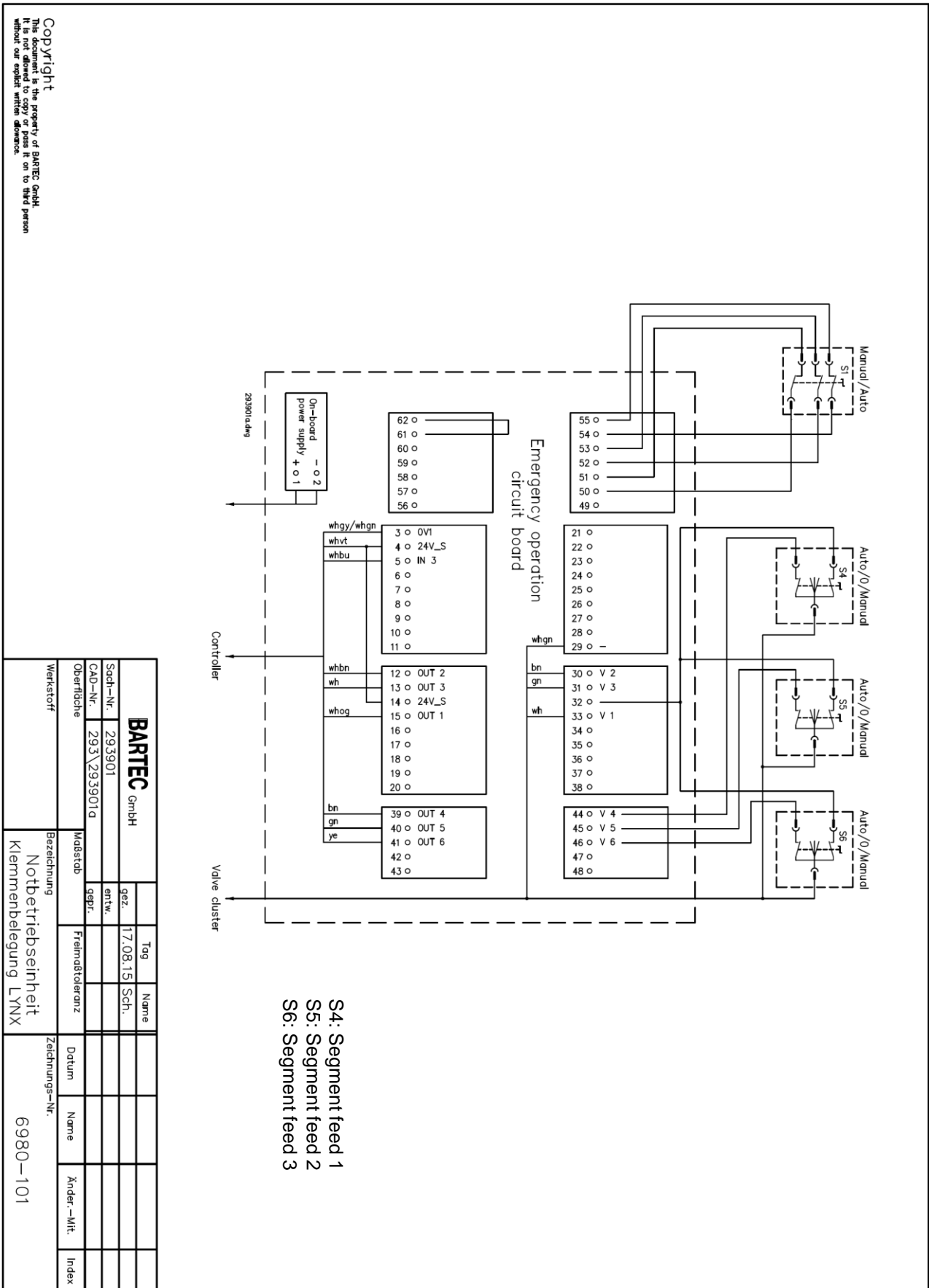
Terminal connections of Bottle Drive

Bottle Drive with pneumatic lifting device type 6774-10

Outputs of Ultrasampler type 6771-31

Terminal	Signal designation	Colour	Connected to
5.9.25	+24V on-board power supply, auxiliary supply for sensor system		As required
26	Digital input IN 1		As required
27	Digital input IN 2		As required
28	Digital input IN 3		As required
29	Digital input IN 4		As required
30	Digital input IN 5		As required
31	Digital input IN 6, (bottle in position)	bl	Bottle Drive
32	Digital input IN 7, (star in position)	wire jumper	P-Star (terminal 49)
33	Digital input IN 8, (bottle down)	pi/wh	Bottle Drive
34	0 V on-board power supply, reference ground for IN 1-8		As required
42	Signal M-Up, bottle lifting motor	bn	
43	Signal M-Down, bottle lifting motor	rd	
44	Signal M-Outlet, engine of outlet cassette	ye	
45	Signal M-Inlet, motor of inlet cassette	gn	
46	Signal M-star, motor of star wheel drive	rs	
47	Signal P-star, self-holding contact for star wheel drive	pk	
48	Ground reference potential for signal P-star	gywh	
49	Signal P-star, feedback signal	wire jumper	IN 7 (terminal 32)
50	+ 24 V on-board power supply line for bottle drive	bk	
51	GND on-board power supply line for bottle drive	bnwh	
⊕	Shield connection for bottle drive cable		
⊕	Shield connection on-board power supply cable		
52	+ 24 V on -board power supply feed-in		Truck battery+
53	GND on-board power supply feed-in		Truck battery -
54	+ 24 V on-board power supply output	rd 1,5 mm ²	Terminal 39, sampler board
55	AGND on-board power supply output	bu 1,5 mm ²	Terminal 40, sampler board
56	+ 44 V operating voltage output for sampler 1	bk 1,5 mm ²	Terminal 41, sampler board

Wiring of Emergency Unit



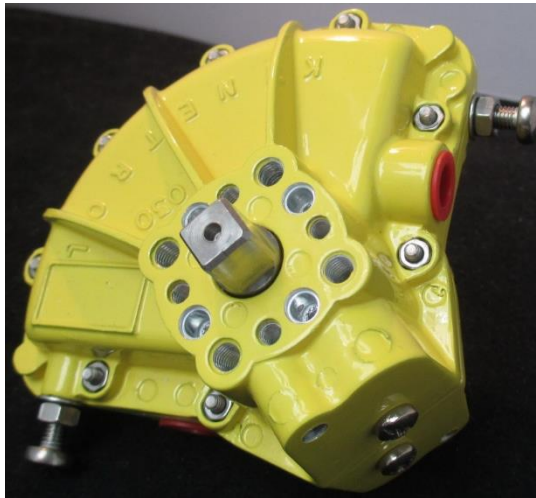
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BARTEC GmbH		Tag	Name
Sach-Nr.	293901	gez.	17.08.15 Sch.
CAD-Nr.	293\293901a	entw.	
Oberfläche	qepf	geprt	
Werkstoff	Freinbdrtoleranz	Datum	
Bezeichnung	Notbetriebseinheit	Zeichnungs-Nr.	6980-101
	Klemmenbelegung LYNX	Name	
		Änder.-Mit.	
		Index	

S4: Segment feed 1
 S5: Segment feed 2
 S6: Segment feed 3

5.10 Kinetrol (medium)

Order no.: 304536



Technical data

5.1	Device-specific data	
	Operating pressure	Max. 7 bar
	Air connection	IG 1/8"
	Ambient conditions	
	Operating temperature	-20 ... +80 °C
	Mechanical data	
	Housing specification	Epoxy resin, powder-coated
	Weight	0.70 kg
	Dimensions	113 x 91.4 x 84
	Accessories	
	Designation	Order no.
	Angle bracket, medium, DN 40	304815
	Angle bracket, medium, DN 50	306271
	Threaded union QSML 1/8" 6 mm	202418

6 Temperature probe with milk sensor series B type 6703-11

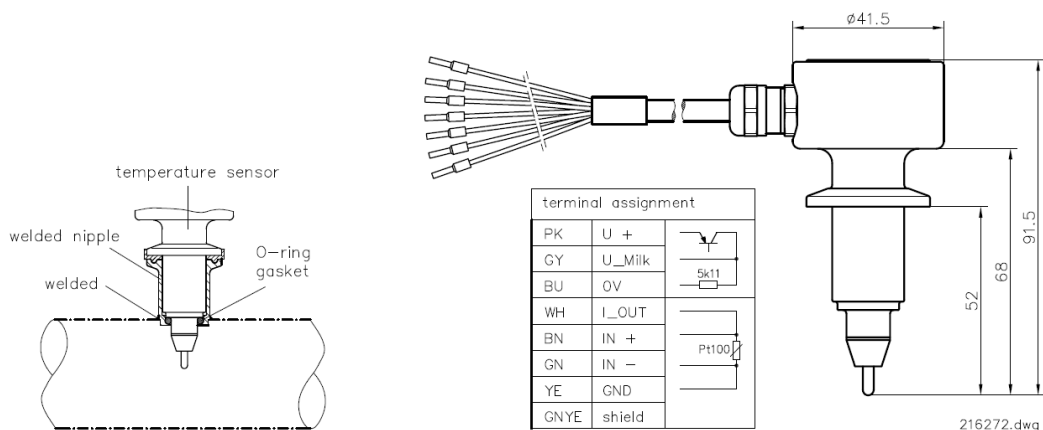
Order no.: 216272



6.1 Technical data

Device-specific data	
Measuring element	Pt 100 DIN IEC 751 Class A
Electrical data	
Operating voltage	DC 24 V, 50 mA
Connection	5 m cable (wire end ferrules)
Milk sensor alternating voltage	12 V AC, approx. 1.5 kHz
Milk sensor switching threshold	Approx. 500 Ω
Milk sensor output	Positive switching (DC +24 V) impulse current \leq 20 mA
Ambient conditions	
Operating temperature	- 20 ... + 60 °C
Sensor element temperature range	- 20 ... + 100 °C
Climatic category / protection class	JUC / IP 65 (encapsulated)
Mechanical data	
Housing specification	V ₂ A 1.4301
Weight	0.5 kg
Fitting	DN 20 clamp
Installation position	Optional, preferably vertical upright for sensor function

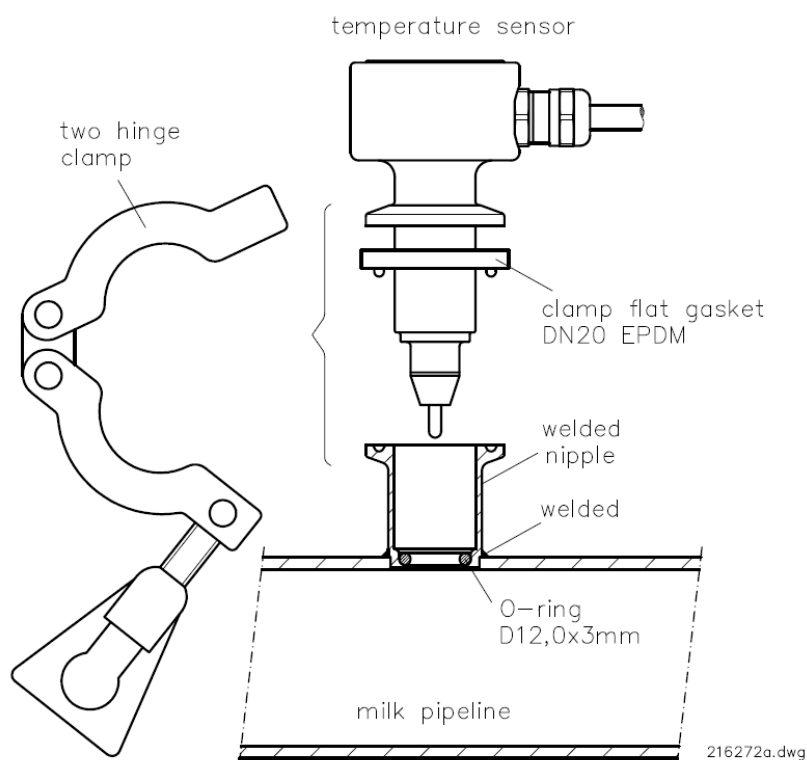
6.2 Dimensions



6.3 Assembly/installation

Follow the instructions below for installation in the milk pipeline by means of welded nipple type 6701-00-021:

- Weld the nipple into the milk pipeline, mask joints and clean.
- Apply a light coating of grease to O-ring D 12,0 x 3,0 VMQ 70 FDA (Best.Nr. 335326) (attached to temperature probe), insert it in the welded nipple and, using a fingertip, fit it carefully in the O-ring groove at the front end. Adjust and use fingertip to check that it is seated evenly.
- Fit clamp-type flat gasket DN 20 EPDM on tip of probe and insert probe carefully in welded nipple as far as it will go, making slight turns to the left/right to ease it in.
- Lock the probe in position with the two-hinged clamp, tightening the wing bolt by hand only.



7 Milk sensor, series A type 6703-16

Order no.: 275354

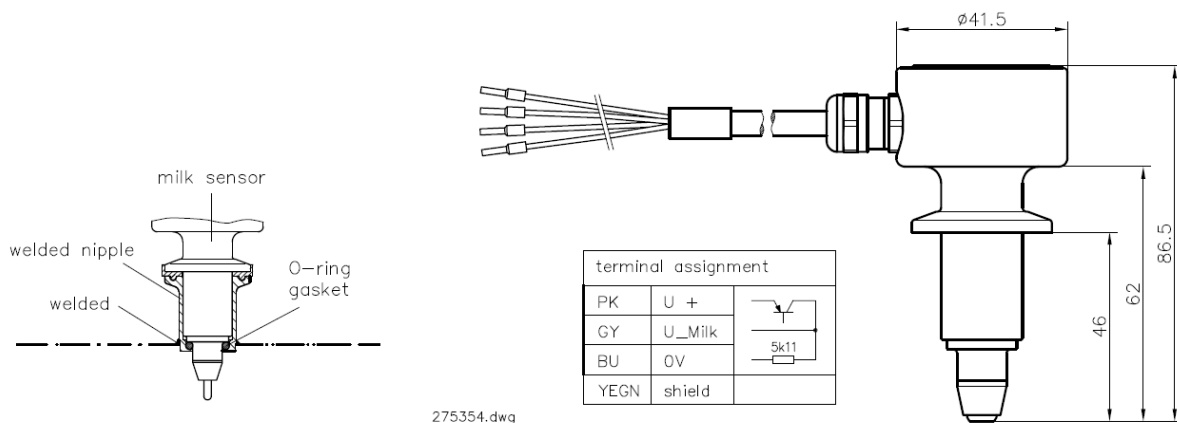
The milk sensor type 6703-16 signals when milk is in the pipe via a positive output.



7.1 Technical data

Electrical data	
Auxiliary power	DC 24 V (+ 10 ... - 20 %), 50 mA
Connection type	5 m cable (wire end ferrule)
Milk sensor output	Positive (DC + 24 V) Switching current \leq 20 mA
Milk sensor switching threshold	Approx. 500 Ω
Milk sensor alternating voltage	12 V AC, approx. 1.5 kHz
Ambient conditions	
Operating temperature/sensor element	- 20 ... + 60 °C / up to + 80 °C for short durations
Storage temperature	- 30 ... + 70 °C
Protection class	IP 65 (encapsulated)
Mechanical data	
Weight	0.5 kg
Housing specification	V _{2A} 1.4301
Fitting	DN 20 clamp

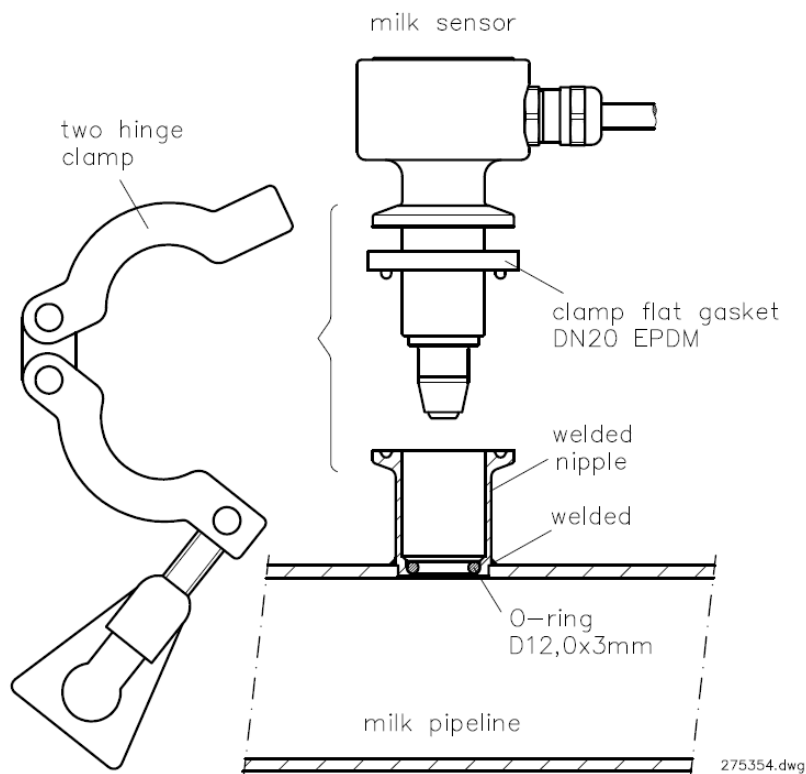
7.2 Dimensions



7.3 Assembly/installation

Follow the instructions below for installation in the milk pipeline by means of welded socket type 6701-00-021:

- Weld the socket into the milk pipeline, mask joints and clean.
- Apply a light coating of grease to O-Ring D 12,0 x 3,0 VMQ 70 FDA (Best.Nr. 335326) (attached to temperature probe), insert it in the welded socket and, using a fingertip, fit it carefully in the O-ring groove at the front end. Adjust and use fingertip to check that it is seated evenly.
- Fit clamp-type flat gasket DN 20 EPDM on tip of probe and insert probe carefully in welded socket as far as it will go, making slight turns to the left/right to ease it in.
- Lock the probe in position with the two-hinged clamp, tightening the wing bolt by hand only.



8 Air detection sensor basic 2,5", type 6703-21

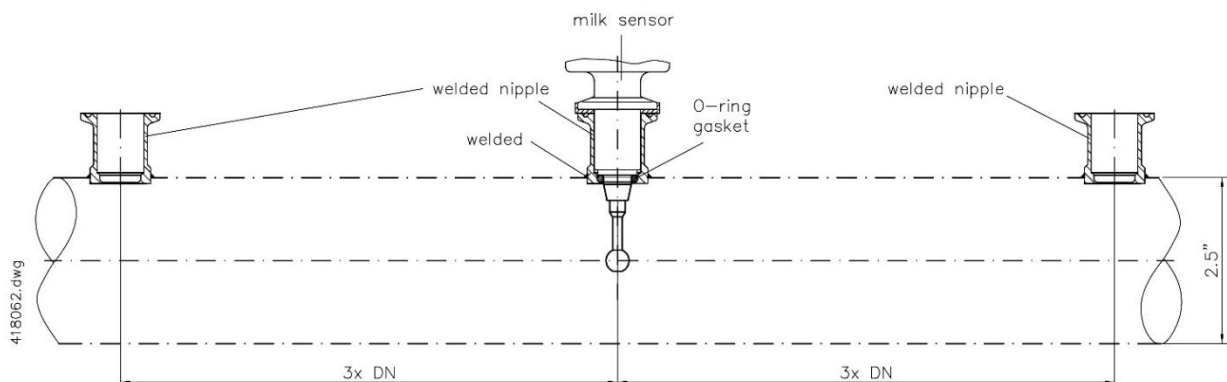
Order No.: 418062



8.1 Technical data

Electrical data	
Operating voltage	DC 24 V (+ 10 ... - 20 %), 50 mA
Connection	5 m cable (conductor and sleeves)
Output milk sensor (U-Milk)	Analog 0,0 ... 2,3V
Measuring range	0 ... 5% air content (with a homogeneous liquid)
AC voltage of milk sensor	12 V AC, approx. 1,5 kHz
Ambient conditions	
Operating temperature/sensor element	- 20 ... + 60 °C / briefly up to + 80 °C
Storage temperature	- 30 ... + 70 °C
Protection class	IP 65
Mechanical data	
Weight	0.5 kg
Casing	V _{2A} 1.4301
Assembly	DN 20 clamp

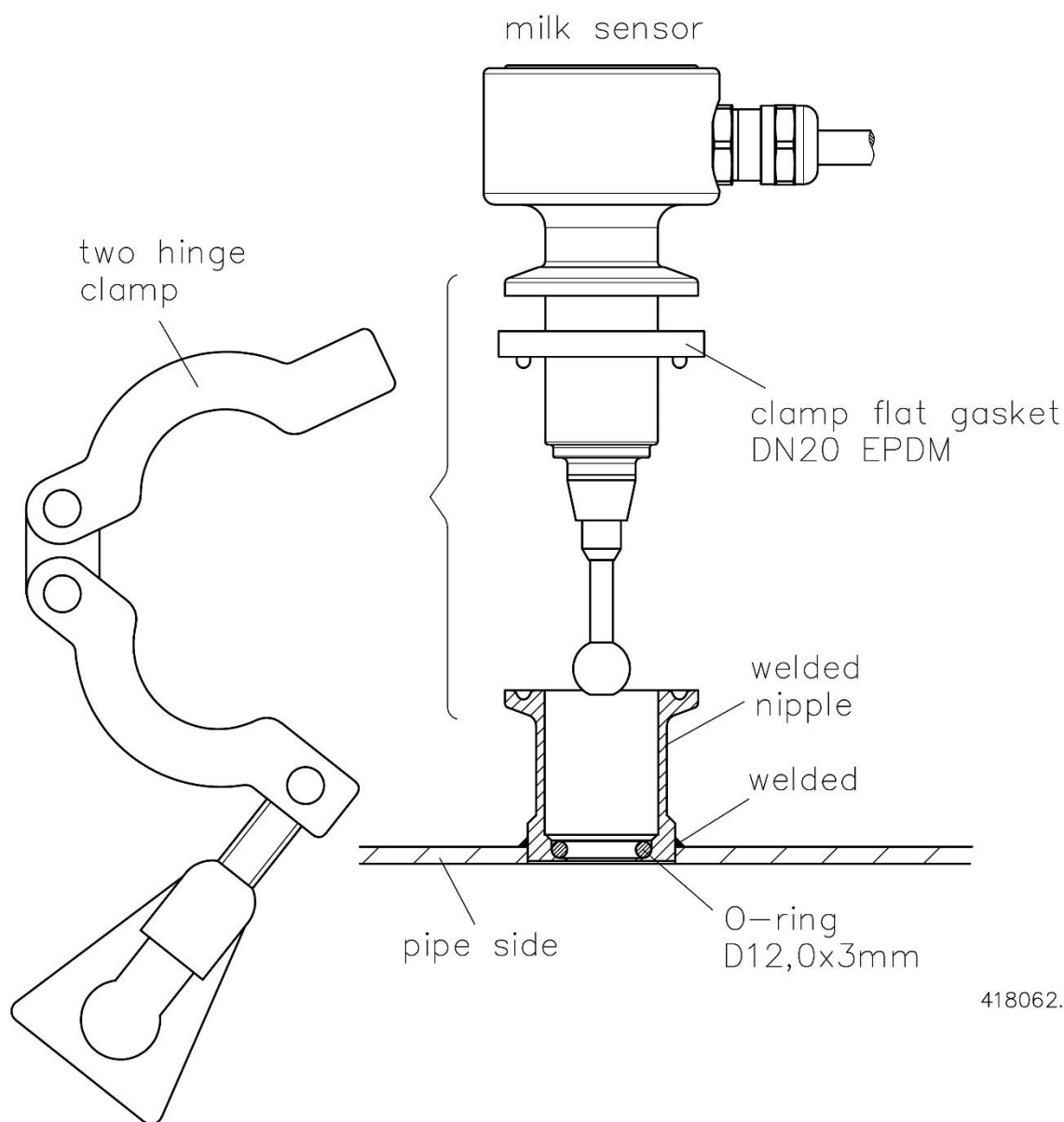
8.2 Dimensions



8.3 Assembly/installation

Follow the instructions below for installation in the milk pipeline by means of welded socket type 6701-00-021:

- Weld the socket into the milk pipeline, mask joints and clean.
- Apply a light coating of grease to O-Ring D 12,0 x 3,0 VMQ 70 FDA (Best.Nr. 335326) (attached to temperature probe), insert it in the welded socket and, using a fingertip, fit it carefully in the O-ring groove at the front end. Adjust and use fingertip to check that it is seated evenly.
- Fit clamp-type flat gasket DN 20 EPDM on tip of probe and insert probe carefully in welded socket as far as it will go, making slight turns to the left/right to ease it in.
- Lock the probe in position with the two-hinged clamp, tightening the wing bolt by hand only.



9 Flow Meter MID type 6823-x

Magnetic-inductive MID flow rate meters, type 6823-x, are precision sensors designed to measure the volume of electrically conductive liquids. Their robust build and material specification make them particularly suitable for flow measurement applications in areas subject to strict hygiene standards, such as the measurement of milk quantities on collection vehicles. All the products can be calibrated.

9.1 Technical data

Specific Data																													
Measure range	100 l/min to 2000 l/min, depending on version see table																												
Accuracy	≤ 0,3 % (In the above measuring range)																												
Conductivity	> 5 µS/cm																												
Pressure	max. 10bar																												
Electrical Data																													
Auxiliary voltage	24V DC ±15%																												
Power consumption	max. 6W																												
Outputs	PNET/ 3-Chanal (open collector)																												
Pulse output	0 – 1000 Hz																												
	volumetric measurement signal for counter indication of the current flow																												
3 channel pulse output	as 1 channel pulse output with direction signal and error signal																												
	as 2- or 3 channel pulse output																												
Analog output	4 ... 20 mA (external source)																												
Connection	7 m connection cable 10x0,25mm ² shielded, with open ends PG11 cable bushings, internal screw-type terminals.																												
Connection cable assignment	<table border="1"> <thead> <tr> <th>MID-terminal</th> <th>Wire color</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>pk/gy</td> <td>+24V</td> </tr> <tr> <td>2</td> <td>Shield</td> <td>GND</td> </tr> <tr> <td>7</td> <td>wh</td> <td>+ Display</td> </tr> <tr> <td>8</td> <td>bu</td> <td>- Display</td> </tr> <tr> <td>13</td> <td>bn</td> <td rowspan="3">S B A P-NET</td> </tr> <tr> <td>14</td> <td>gn</td> </tr> <tr> <td>15</td> <td>ye</td> </tr> <tr> <td>16</td> <td>vt</td> <td rowspan="2">Output 3 GND</td> <td rowspan="2">Output 3</td> </tr> <tr> <td>17</td> <td>bk</td> </tr> </tbody> </table>	MID-terminal	Wire color	Signal	1	pk/gy	+24V	2	Shield	GND	7	wh	+ Display	8	bu	- Display	13	bn	S B A P-NET	14	gn	15	ye	16	vt	Output 3 GND	Output 3	17	bk
	MID-terminal	Wire color	Signal																										
	1	pk/gy	+24V																										
	2	Shield	GND																										
	7	wh	+ Display																										
	8	bu	- Display																										
	13	bn	S B A P-NET																										
	14	gn																											
	15	ye																											
16	vt	Output 3 GND	Output 3																										
17	bk																												
Connection three-channel pulse output	<table border="1"> <thead> <tr> <th>MID (terminal)</th> <th>1 channel</th> <th>2 channel 90°</th> <th>3 channel 120°</th> </tr> </thead> <tbody> <tr> <td>3 – 4</td> <td>Phase 1</td> <td>Error</td> <td>Phase 1</td> </tr> <tr> <td>18 – 17</td> <td>Error</td> <td>Phase 1</td> <td>Phase 2</td> </tr> <tr> <td>16 – 17</td> <td>UP/DOWN</td> <td>Phase 2</td> <td>Phase 3</td> </tr> </tbody> </table>	MID (terminal)	1 channel	2 channel 90°	3 channel 120°	3 – 4	Phase 1	Error	Phase 1	18 – 17	Error	Phase 1	Phase 2	16 – 17	UP/DOWN	Phase 2	Phase 3												
	MID (terminal)	1 channel	2 channel 90°	3 channel 120°																									
	3 – 4	Phase 1	Error	Phase 1																									
	18 – 17	Error	Phase 1	Phase 2																									
16 – 17	UP/DOWN	Phase 2	Phase 3																										
Ambient conditions																													
Admissible operating temperature	-10 ... +50°C																												
Admissible storage temperature	-10 ... +50°C																												
Protection class	IP 67																												

Mechanical data	
Dimensions	See drawing
Weight	Approx 5kg
Material	Stainless steel teflon coated, stainless steel, PPO Noryle
Connection	Clamp NW 2", NW 2,5", NW 3" ISO 2852

MID order data								
MAK 3003		MAK 3002		Diameter	Flow min.	Flow max.	Min. volume	Country
Type	Order number	Type	Order number					
		6823-1	U950 20 68231	NW 2"	25 l/min	500 l/min	20 l	D, A, CH
		6823-3	U950 20 68233	NW 2"	66 l/min	660 l/min		NL
		6823-4	U950 10 68234	NW 2,5"	75 l/min	1000 l/min	50 l	D, A, CH
		6823-4.1 (für V2000)	U950 10 682341	NW 2,5"	75 l/min	1000 l/min	50 l	D, A, CH
		6823-4.2	247094	NW 2,5"	100 l/min	1250 l/min	100 l	D
6823-4.3	387985			NW 2,5"	83 l/min	1333 l/min	50 l	D, A, CH
		6823-5	215774	NW 2,5"	83 l/min	1167 l/min	50 l	NL
		6823-6	242839	NW 3"	50 l/min	2000 l/min	100 l	NL
		6823-9.1	247093	NW 3"	100 l/min	1400 l/min	200 l	D
6823-9.2	301246			NW 3"	200 l/min	2000 l/min	100 l	
		6823-9.3	303361	NW 3"	200 l/min	2000 l/min	200 l	D
		6823-15	U950 20 682315	NW 2"	25 l/min	500 l/min	50 l	B
		6823-16 ****	U950 10 682316	NW 2,5"	75 l/min	1000 l/min	50 l	D
		6823-17 ****	U950 10 682317	NW 2"	25 l/min	500 l/min	20 l	D
		6823-19	U95020 682319	NW 2,5"	75 l/min	1000 l/min	100 l	B
		6823-18	U950 20 682318	NW 2"	25 l/min	500 l/min	20 l	D
		6823-19.1	U950 20 6823191	NW 2,5"	75 l/min	1000 l/min	50 l	B
		6823-20 **	U950 20 682320	NW 3"	100 l/min	2000 l/min	200 l	NZ
		6823-25	U950 20 682325	NW 2,5"	75 l/min	100 l/min	50 l	D
		6823-28 *	U950 20 682328	NW 2"	25 l/min	500 l/min	20 l	PL

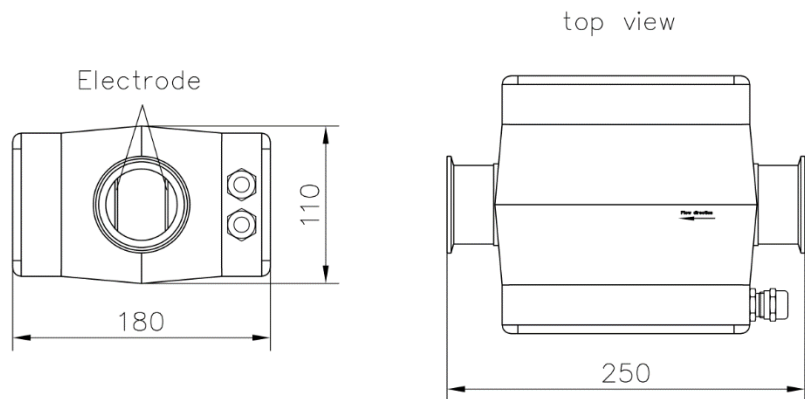
* Resolution 0,05 ltr.

** without 5m-connecting cable

*** MID with 3 channel pulse output: coding for 1 channel pulse output, direction signal and error signal

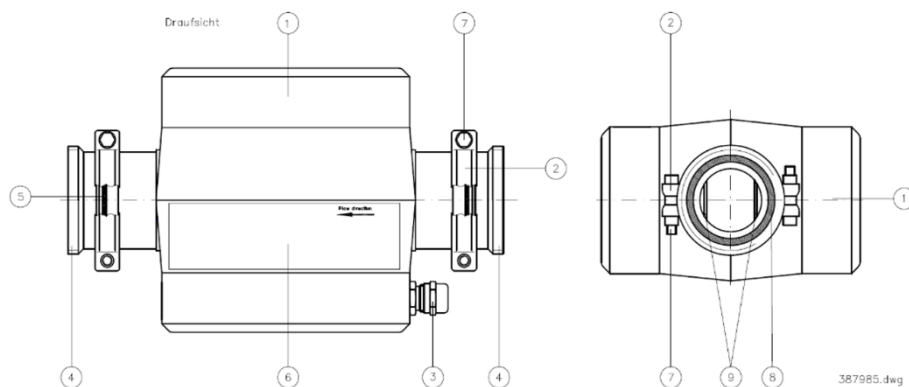
**** MID with 3 channel pulse output: 120° phase displacement

9.2 Dimensions



407364.dwg

9.3 Assembly/installation

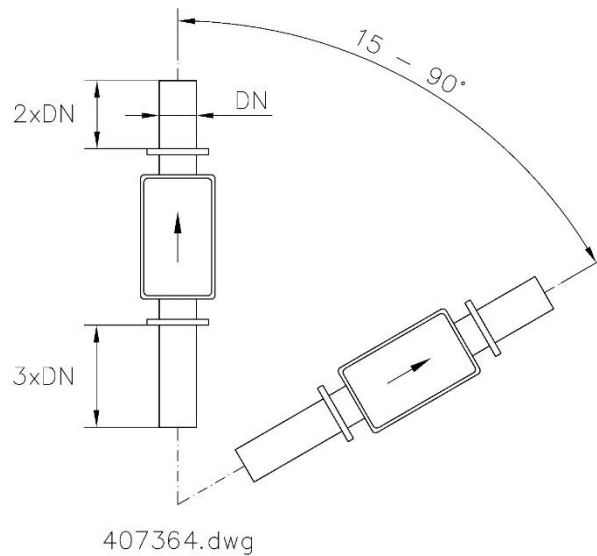


1	Cover	5	Flat gasket	9	Electrodes
2	Fastening clamp	6	Type plate		
3	Cable feed	7	Hexagon head screw		
4	connection	8	Sealing ring		

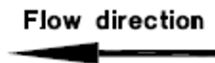
The flow rate meter can be mounted either horizontally or vertically. The release of air must be guaranteed at all times.

It is strictly mandatory to provide a straight flow-calming section upstream and downstream of the MID of $L \geq 2 \times$ nominal diameter D.

Mounting position



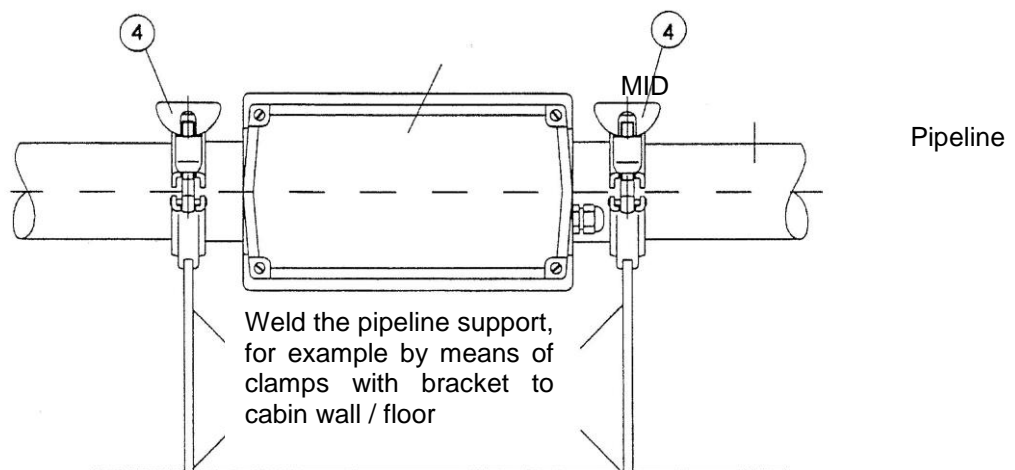
The direction of flow is indicated by an arrow on the type plate (6).



Installation position:

Horizontal/flat, rising slightly in the direction of flow so as to allow trapped gases to escape, or vertical. May only be operated with flow-calming section on both sides of $L \geq 2 \times D$.

There must not be any mechanical forces on the flow rate meter either during assembly/disassembly or during operation. The pipes which are connected to the unit on both sides must therefore be duly supported (see diagram below).



Installation location:

- At the lowest point of the pipe system, rising slightly in the direction of flow
- Position at which the MID is always filled with liquid.
- Reduce amount of gas in the liquid to a minimum as entrained air can also affect the flow measurement. Therefore install the flow rate meter in the pipe system at the point of maximum pressure where the air volume is minimal.
- After air separator, if air can be sucked in.
- The ambient temperature at the place of installation must be within the permissible range of -10...+50°C. The liquid flow (measuring medium, cleaning fluid) through the device must not exceed the maximum temperature for CIP cleaning 100 ° C.
- Position the flow rate meter so that it can be easily accessed for servicing.
- The electrodes in the MID always have to be aligned vertically.

Important information for assembly/disassembly:

When installing MID units with dairy pipe thread connections, it is essential to follow the instructions below in the order listed in order to prevent strong mechanical forces on the MID unit (which can damage or destroy the unit).

Installation:

- First remove the threaded milk pipe adapter, if still attached to the MID. To do this, open the fastening clamps (2) on both sides and remove the pipe connections from the MID.

**Attention:**

Do not lose the seals and put them back carefully when reassembling.

-
- First screw the threaded milk pipe adapters with the union nuts on both sides of the pipe connections.
 - Then fit the MID (not forgetting the flat gaskets (5)) and secure with the fastening clamps (2). It might be easier if the pipe supports/anchors are slightly loosened first. ⇒ Tighten again at the end.

Disassembly:

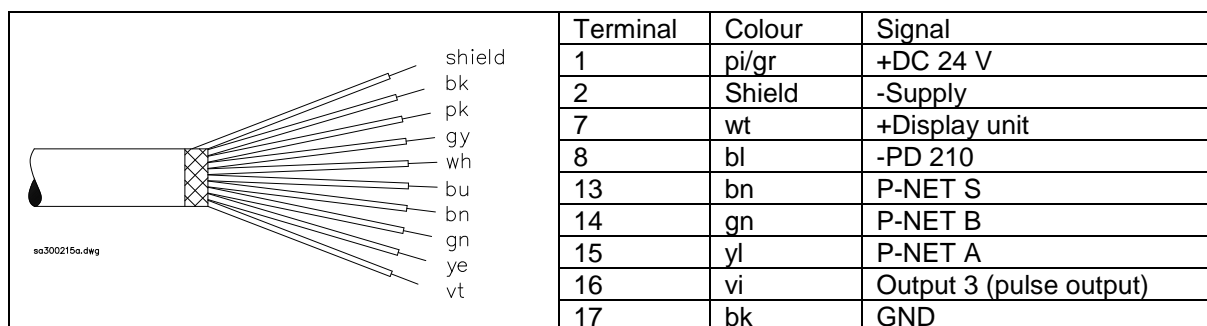
- First take out the MID by removing the fastening clamps (2) on both sides. It might be easier if the pipe supports/anchors are slightly loosened first.
- If necessary at this point, take off the threaded milk pipe adapters by undoing the union nuts.

**Attention:**

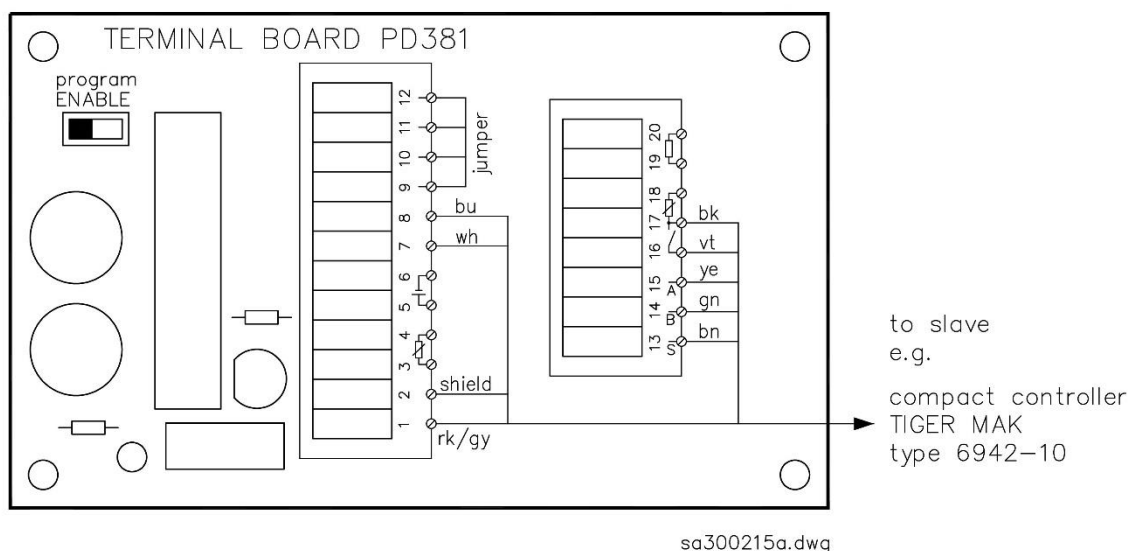
Do not lose the seals and put them back carefully when reassembling.

9.4 Wiring

The MID is supplied as standard with 5 m of cable which is connected as shown on the diagram below. Please follow the directions for use of the follow-on device when wiring.



MID wired with P-NET, pulse output connection and display unit connection.



9.5 Maintenance and servicing

The usual cleaners approved for use with food in the dairy industry can be used to clean the flow rate meter.

The cleaning fluid passing through the system must not exceed the temperature limit of max. + 100 °C.

10 Barcode reading unit type 6723-10

Order no.: U96417672310

The bar code reading unit type 6723-10 can be used to decode the pulse sequence of a connected bar code reader and to transmit the data via P-NET (RS485) for further processing.

Bar code readers with TTL output level can be connected, where "bright" corresponds to low and "dark" corresponds to high.

The bar code reading unit will accept the following four types of bar code if they contain the mandatory number of alphanumeric characters.

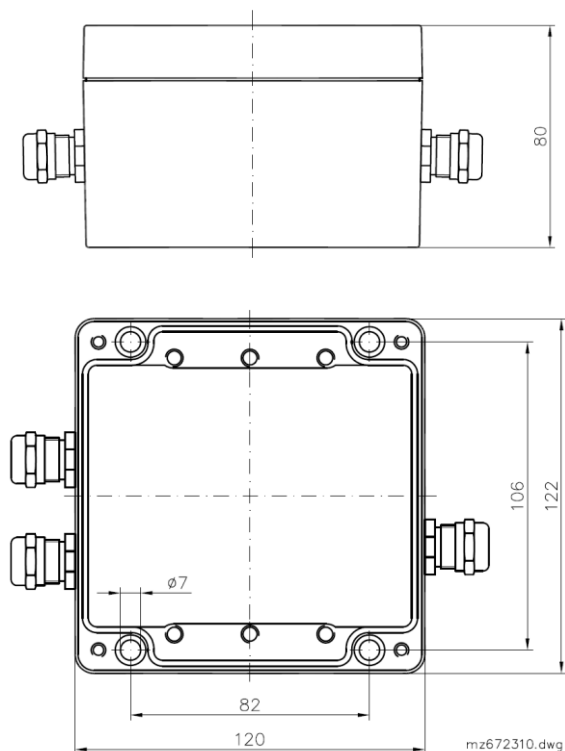
Bar code	Number of characters
Interleaved 2 of 5	4 ... 32
UPC/EAN	Fixed length
Codabar	1 ... 32
Code 11	1 ... 32
Code 39	1 ... 32
Code 128	1 ... 32
MSI Code	1 ... 32

The bar code reading unit is set at the factory to read bar codes of the "Interleaved 2 of 5" type with the mandatory 10 characters. The default operating mode is "continuous scanning".

10.1 Technical data

Electrical data	
Auxiliary power	Rated voltage: DC 24 V \pm 20 % Rated output: 1.5 W (excluding bar code reader, excluding heating)
Fuse	2 x 1 A (time-lag)
Fieldbus interface	P-NET (RS485), max. line length 300 m
Electrical connection	
Connection	Screw terminals 0.2 ... 1.5 mm ² 3 x cable fitting PG9, cable diameter 4 ... 8 mm
Bar code reader	Scanner with TTL-compatible output, "bright" \cong low, "dark" \cong high
Bar code reader heater	12 or 24 V DC, max. 1.6 W
Bar code reader electronics	5 V DC, max. 50 mA
Ambient conditions	
Operating temperature	- 20 ... + 60° C
Storage temperature	- 40 ... + 85° C
Climate class/protection type	JUF / IP 65
Mechanical data	
Housing specification	Die-cast aluminium
Dimensions	120 x 122 x 80 (mm)
Weight	Approx. 12 N \cong 1.2 kg
Installation position	Optional, but cable inlets must not face upwards

10.2 Dimensions



10.3 Installation

Installation location:

Position at a suitable location not subject to major vibrations near the bar code reader, taking due account of the length of its cable.

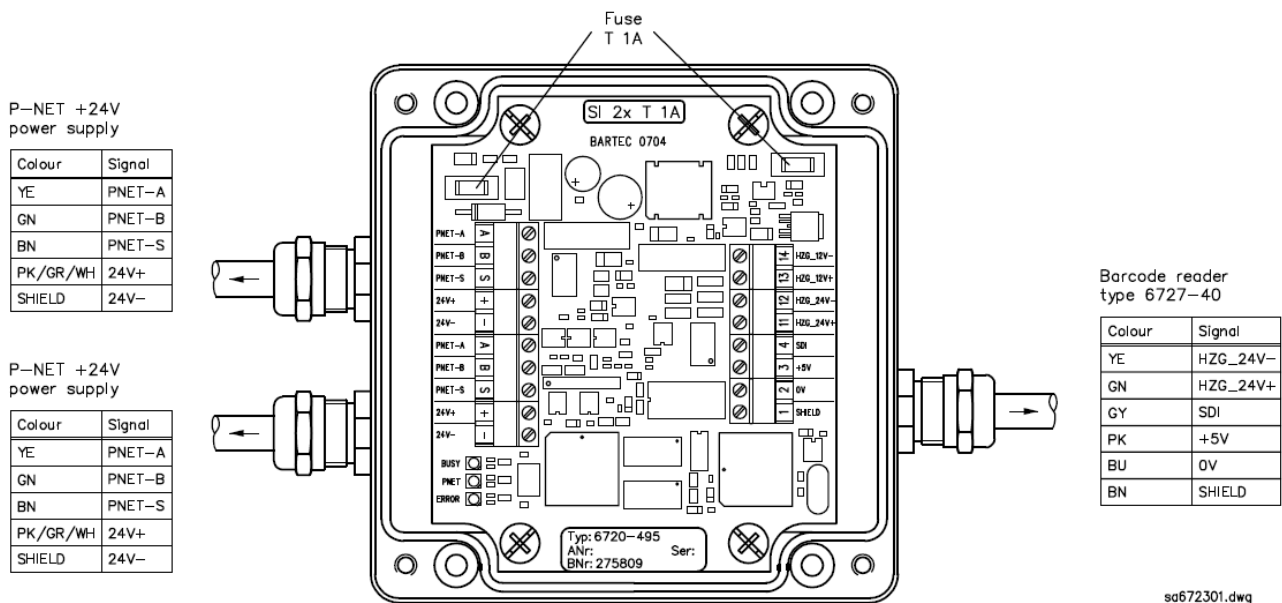
It must be possible to attach the connection leads in the bar code reader unit when installed.

Installation:

Affix lower section of housing with 4 x M6 mounting bolts. See section on dimensions for hole spacing and bolt length.

To install, undo the four bolts in the top housing section and remove the top housing section.

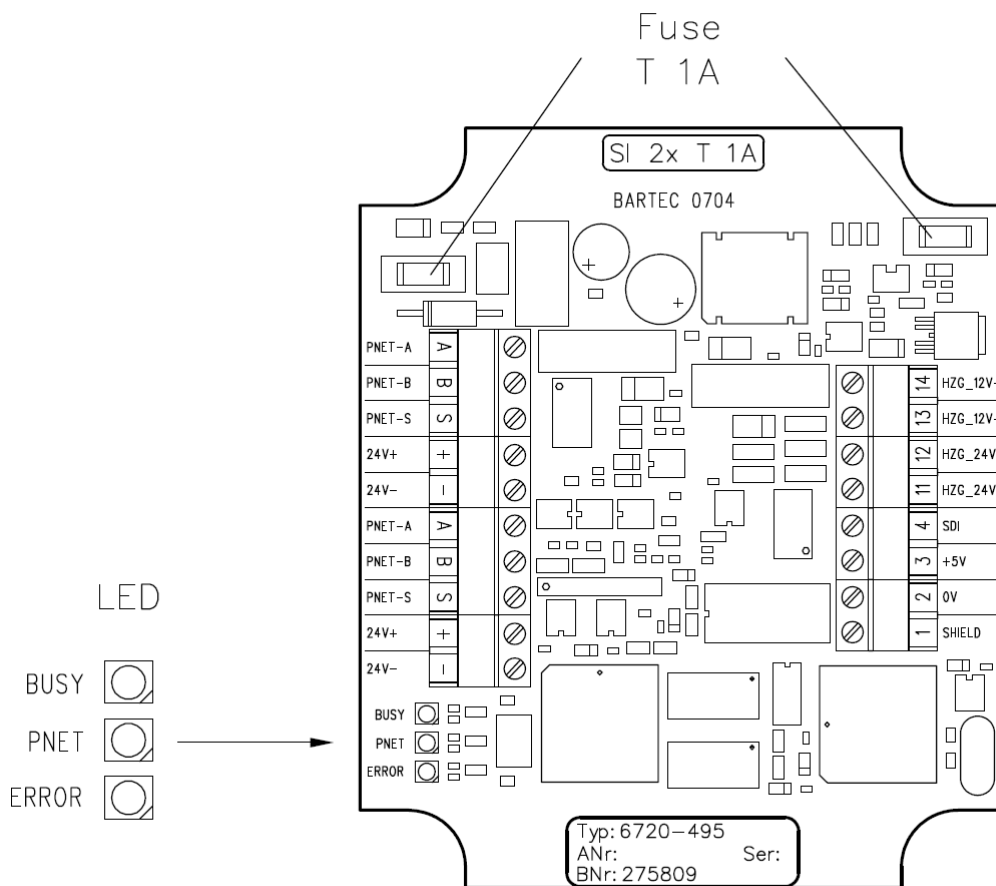
10.4 Wiring



Terminal designation of bar code reading unit

INPUT SIDE			
Signal	Designation	Terminal	Wire colour
P-NET - A	P-NET - A	A	yl
P-NET - B	P-NET - B	B	gn
P-NET - S	P-NET - S	S	bn
24 V +	Operating voltage	+	pi/gr/wt
24 V -	Operating voltage	-	shield
OUTPUT SIDE			
Signal	Designation	Terminal	Wire colour
HZG_24V-	Bar code reader heating (-24 V), type 6727-40	12	yl
HZG_24V+	Bar code reader heating (+24 V), type 6727-40	11	gn
SDI	Digital input signal (TTL level), type 6727-40	4	gr
+5V	+ Bar code reader operating voltage, type 6727-40	3	pi
0V	- Bar code reader operating voltage, type 6727-40	2	bl
SHIELD	Cable shielding, type 6727-40	1	bn

Status display messages and their meaning



mz672310.dwg

LED	Display	Apparent fault	Remedial action
BUSY	LED BUSY Flashes after switch-on (approx. 1 Hz). The processor system is running.	LED off: Internal fault in processor system	- Bar code reading unit may need to be reconfigured - Fault may need to be read out via P-NET service channel
P-NET	P-NET ON LED flashes via P-NET on the bar code reading unit on write access or read access.	LED off: Bar code reading unit is not eliciting any response from P-NET	- Check P-NET connections (A,B,S); P-NET may be defective - Notify service centre
ERROR	POWER ON LED when 5 V DC is applied to the processors. (The 5 V are routed through to the display by the processor)	LED off: Absence of voltage supply for the processors	- Check for presence of 24 V DC - Check connection cable - Check fuses

11 Barcode reader type 6727-40

Order no.: U96410672740

The bar code reader type 6727-40 is a distance scanner for bar codes. It is used to read bar code labels on BARTEC milk sample bottles of type 6845-x in stationary and mobile systems. It is used in conjunction with bar code reading unit type 6723-10.



11.1 Technical data

Electrical data	
Auxiliary power	Operating voltage: DC 5 V, 17 ... 19 mA Heating: DC 24 V / 1.5 W
Electrical connection	2 m connection cable with open ends, closed with wire end ferrules, cable inlet PG7
Output	TTL-compatible output, "bright" \cong low, "dark" \cong high
Transmitter light	Red light - 900 nm
Ambient conditions	
Operating temperature	- 10 ... + 50° C
Climate class/protection type	KUF / IP 65
Mechanical data	
Housing specification	Plastic housing
Dimensions	99.5 x 26 x 88.3
Height of transmitter light emission	57 mm
Weight	Approx. 3.3 N \cong 0.33 kg
Assembly	Screw fitting with 2 x M4 bolts, hole spacing 61 mm, vertical installation position (according to bar code label)

Terminal assignment

Wire colour	Assignment	Signal
yl	HZG-	Scanner window heating
gn	HZG+	Scanner window heating
gr	SDI	Digital output signal
pi	+5V	Operating voltage
bl	0V	Operating voltage
bn	Shield	Cable shielding

11.2 Dimensions/Installation

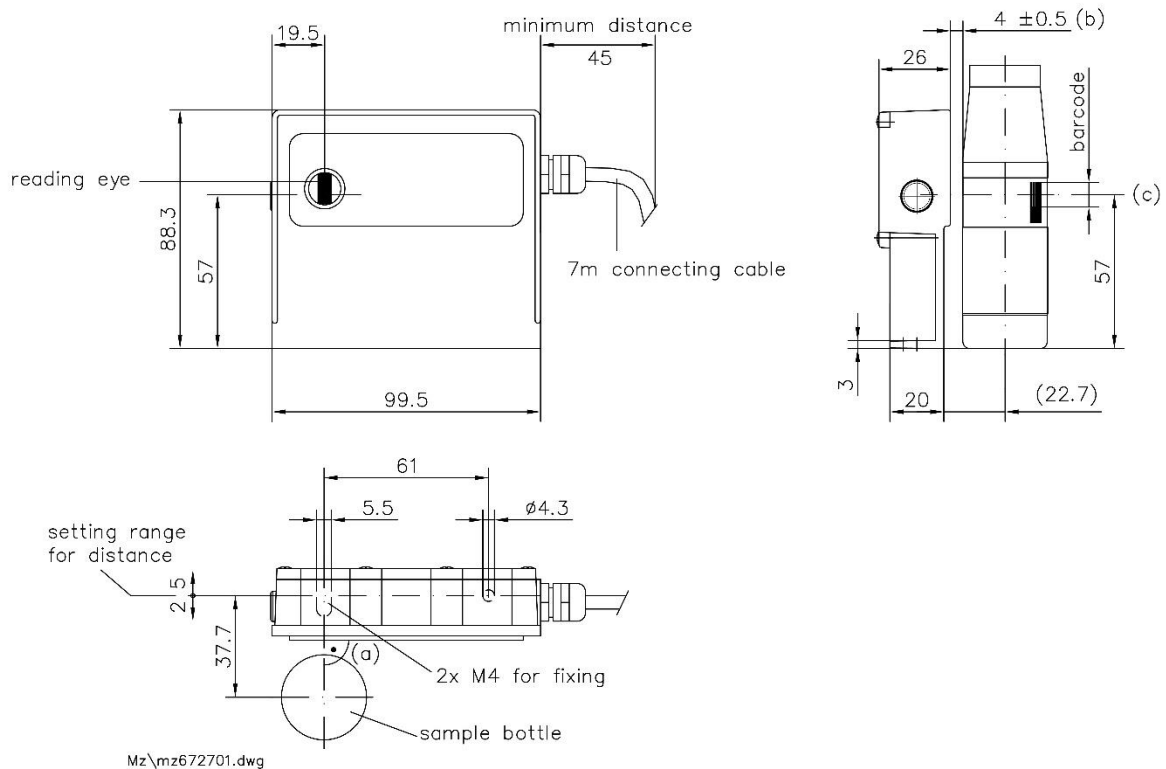
Install the bar code reader as illustrated in the diagrams below.

The following points are important:

The scanner eye must be at right angles to the sample bottle axis (a).

There should be a distance of approx. 4 mm (b) between the bar code reader and the sample bottle. A 4-mm hexagon wrench or the shank of a 4-mm twist drill are examples of possible aids which can be used. The distance can be reduced gradually to as little as 2 mm if the bar code reading cannot be guaranteed to be reliable.

The optical axis (transmitter light) of the bar code reader must be roughly in the middle of the bars in the bar code (c).



12 Barcode-Scanner CCD array, type 6910-30

Order no: 422422

The barcode line scanner type 6910-30 is a distance scanner for barcodes. It is used for reading barcodes in stationary and mobile milk collection systems.

Readable code types:
Standard CODE 39
Interleaved 2 of 5

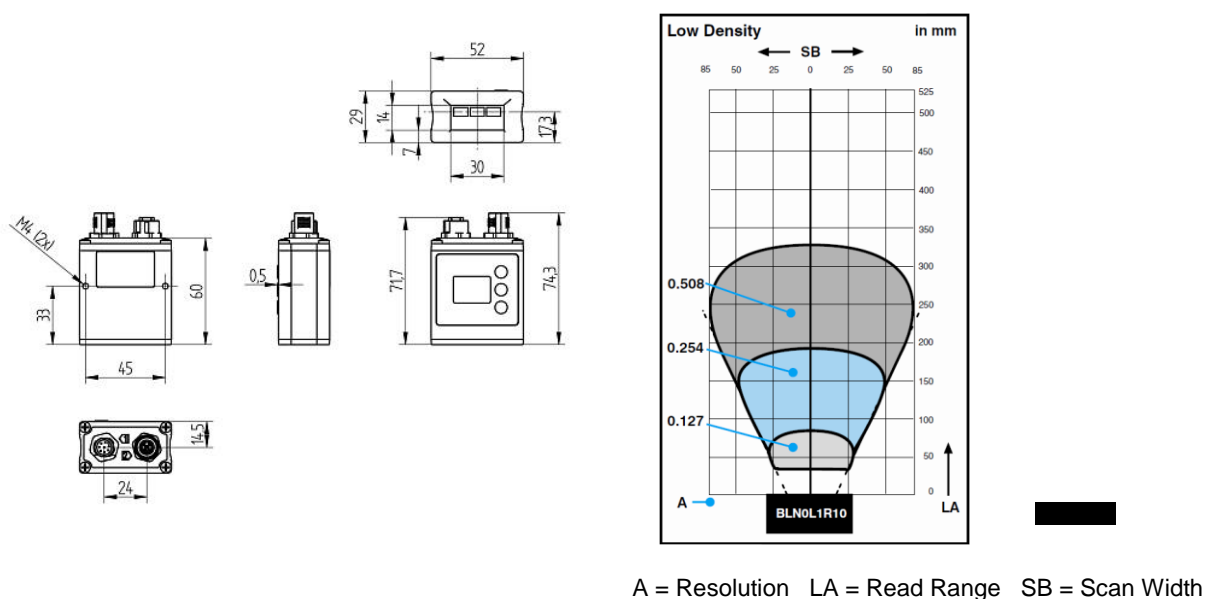


12.1 Technical data

Optical Data			
Read Range	35...320 mm		
Resolution	0,101 mm		
Light Source	Red Light		
Wave Length	660 nm		
Max. Ambient Light	7000 Lux		
Opening Angle	35 °		
Barcode Label Contrast	> 45 %		
Electrical Data			
Supply Voltage	18...30 V DC		
Current Consumption (U _b = 24 V)	< 100 mA		
Scan Rate	530 scans/s		
Temperature Range	-20...50 °C		
Interface	RS-232		
Protection Class	III		
Assignment of Connection	Braid Color	Assignment	Signal
	ws	+ 24 V	Versorgungsspannung
	gn	GND	Versorgungsspannung
	gr	Rx	RS232 Schnittstelle
ge	Tx	RS232 Schnittstelle	
Mechanical Data			
Housing Material	Aluminium		
Weight	130 g		
Degree of Protection	IP67		
Connection	M12 x 1; 8-polig		

12.2 Dimensions

All dimensions in mm (1 mm = 0.03937 Inch)



13 Thermal printer type 6761-11

Order no.: 215004



Thermal printer for simple and reliable recording of measurements and data.

The printer can either be connected directly to the RS 232 interface on the MAK Controller type 6942-10 or controlled via an RS 232 / P-NET converter from the P-NET fieldbus.

Changing the paper:

The tried-and-tested drop-in method of inserting the new paper roll consists of just three quick and easy steps: open printer, insert paper roll, close printer.

13.1 Technical data

Mechanical data	
Dimensions	W x D x H: 145 mm x 195 mm x 148 mm
Installation position	Vertical or horizontal. In case of vertical installation, please note the instructions for attaching the correct labelling strip and changing the paper sensor position.
Housing	Plastic, light grey
Weight	1.8 kg (excl. paper)
Connection	25-pin D-SUB connector, lockable, connection cable incl. plug, cable length 15 m, can be cut to required length
Installation location	In dry, clean areas only within operating temperature limit and climate class, preferably in the driver's cab
Electrical data	
Interfaces	Standard: RS-232
Auxiliary power	DC 24 V / max. 1.5 A
Ambient conditions	
Operating temperature	0 ... 50 °C
Storage temperature	- 20 ... 60 °C (excl. paper)
Climate class/protection type	KWF / IP 30

Accessories:

Paper: Thermal paper (order no. 215115)

Width: 79.5 mm ± 0.5

Max. diameter: 83 mm

Connection cable signal assignment

PIN	Colour	Signal
2	gn	TxD
3	yl	RxD
7	bn	GNG
9 + 10	pi/gr	+24 V
12 + 13	bl/wh	0 V
Housing	Shield	

Fit connection cable to printer with the screws in the cable plug.

Important:

The metal base plate of the thermal printer has an electrical connection to the GND signal of the electronic system and to the cable shield.

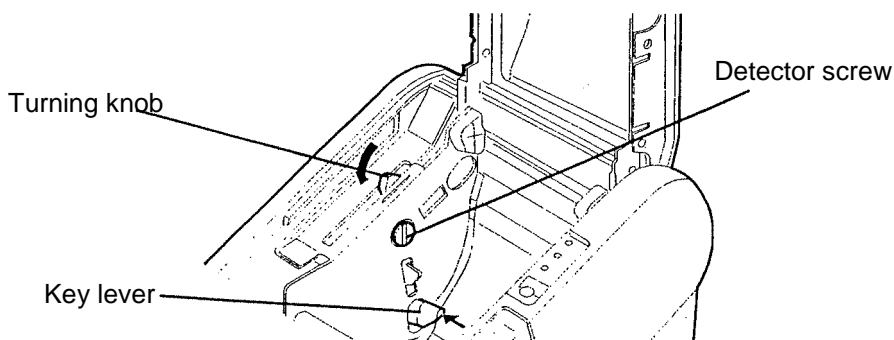
The printer must therefore be insulated from the vehicle chassis.

The cable shield must not be connected to the follow-on device or the shield bar.

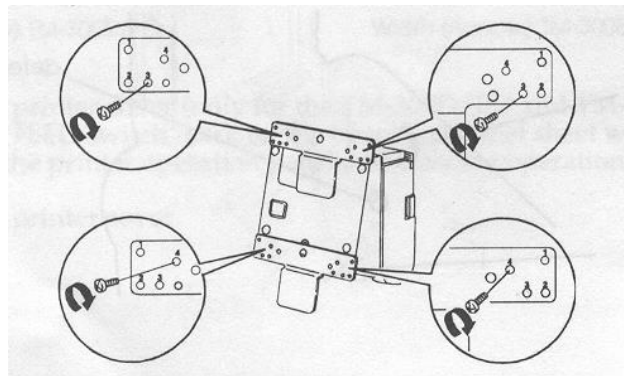
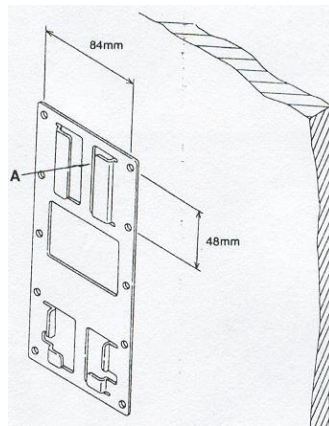
Instructions for vertical installation:

- a) Install the printer so that the paper comes out at the top and the cable connection is facing down.
- b) The labelling strip for feed button and LEDs is "upside down" in this position and must be carefully covered over with the labelling strip provided.
- c) Change the paper sensor position to vertical installation position:
 - Undo detector screw by turning anticlockwise, e.g. using a coin (see diagram)
 - Using a fingertip, press key lever to the side as far as it will go and hold
 - Rotate turning knob in the direction of the arrow until the key lever automatically clicks into the hole in the other side
 - Keep hold of turning knob and tighten detector screw again by turning clockwise

Changing the paper sensor position



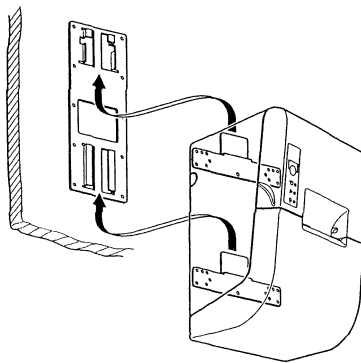
Installation/dimensions for bracket in case of vertical installation



1. Fit retaining plate

2. Fit screw plates on printer

- a) Affix the top plate through the holes marked no. "3"
- b) Affix the bottom plate through the holes marked no. "4" using the screws provided



3. Fit printer by screw plates in retaining plate A!

Printer operation

Control panel

You can control the basic paper feed functions on the printer with the button on the control panel. The LEDs will help you to monitor the printer status.

POWER

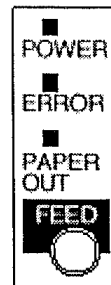
13.1.1 The POWER LED lights up whenever the printer is switched on.

ERROR

This LED indicates a malfunction.

PAPER OUT

This LED indicates that the roll of paper is running out. Put in a new roll of paper so that the printer can continue printing.



When this LED flashes, it indicates standby status during the self-test printout or during the execution of a macro if the execute macro command is used.

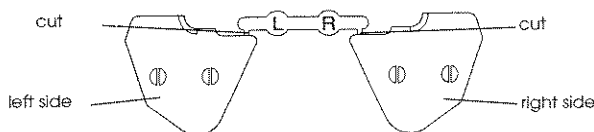
FEED button

This button can be deactivated with the ESC c 5 command.

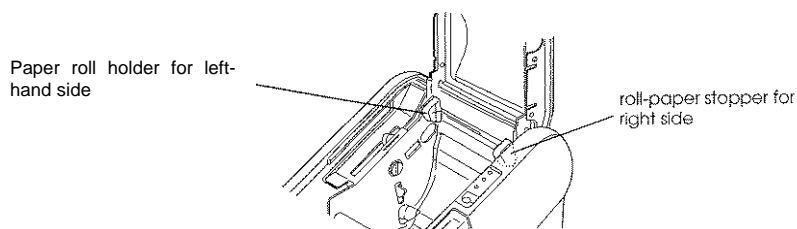
Press the FEED button once to advance the paper by one line. You can also press and hold the FEED button down to keep advancing the paper.

Fitting the paper roll holder

13.1.2 1. Detach the paper roll holder.



2. Open the printer cover and attach the paper roll holder by pressing both fittings into the holes, as shown in the diagram below.



Troubleshooting

General problems

The LEDs on the control panel do not light up.

Make sure that the cable is correctly connected and check that power is being supplied to the entire system.

13.1.3

Printing problems

The ERROR LED is on (not flashing) and the printer will not print.

If the PAPER OUT LED is on, it means that the roll of paper is not fitted or is almost used up. Fit a new roll of paper.

If the PAPER OUT LED is not on, make sure that the printer cover is closed properly. Press the printer cover down until it clicks into place.

The ERROR LED is flashing and the printer will not print.

First turn the printer off and check if there is a paper jam.

If there is not a paper jam and the printer has been printing for a relatively long time, the printhead may have overheated. If the printhead has overheated, the printer will continue printing as soon as the head has cooled down (usually within two to three minutes).

If there is no paper jam and the printhead has not overheated, switch off the printer and switch it on again after approx. 10 seconds.

The ERROR LED is not on but the printer will not print.

Try to run the self-test to check if the printer is working properly.

If the self-test works correctly, make the following checks:

Check the connection on both ends of the cable.

If the printer still will not print, contact your after-sales service centre or replace the printer.

The print quality is poor.

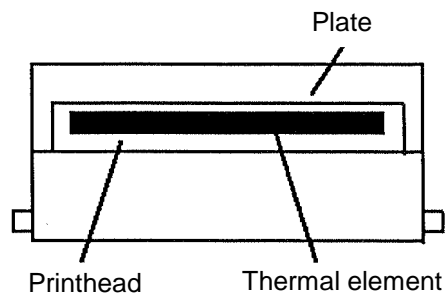
Dust or lint on the heating element of the thermal printhead can affect the print quality. Try to clean the printhead, as instructed below.

Cleaning the printhead

CAUTION:

The printhead can be very hot after printing. Do not touch it. Allow it to cool down before cleaning it. Do not touch the printhead with your fingers or with a hard object in order to avoid damaging it.

1. Open the printer cover.
2. Clean the heating element of the printhead with a cotton cloth dampened with an alcohol-based solvent (ethanol, methanol or IPA).



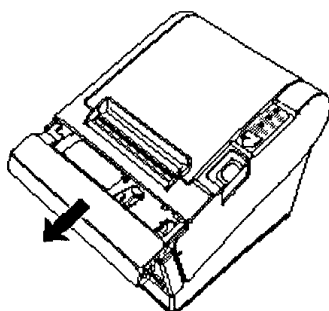
Problems with the paper feed

There is a paper jam in the printer.

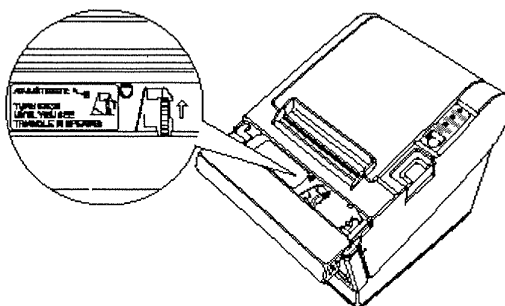
CAUTION:

The printhead can become very hot after prolonged continuous use. Do not touch it.

1. Follow the instructions below to clear a paper jam:
2. Switch the printer off and press the relevant button to open the cover.
3. Remove the jammed paper, put the roll back in the printer and close the cover.
4. If paper has caught in the automatic cutter and the printer cover will not open then open the cover on the cutter indicated in the diagram below.



5. Then turn the button until you can see into the opening, as shown in the diagram below. This will reset the cutter blade to normal position. There is a sticker near the cutter as a guide.



6. Close the cover on the cutter.
7. Open the printer cover.
8. Remove the jammed paper.

Problems with the automatic cutter

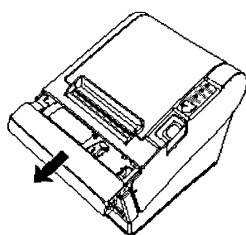
The paper cutter is blocked.

If a foreign object, such as a drawing pin or paper clip, has fallen into the cutter and caused a blockage, the printer will be in error state and will automatically start a recovery process.

If the problem is not serious, the cutter will return to its normal position and no intervention will be required from the user.

If the cutter does not automatically return to its normal position then follow the instructions below to remedy the problem.

1. Pull the cover on the cutter towards you so that you can turn the button for the cutter motor.
2. Follow the instructions on the sticker and turn the button until the blade appears in the opening.
3. Close the cover on the paper cutter.



Self-test

The self-test allows you to see whether the printer is working correctly. It checks the control circuits, print mechanism, print quality, ROM version and DIP switch settings.

This test is independent of any other unit or software.

Running the self-test

1. Make sure that the printer is switched off and the covers are properly closed.
2. Press and hold the FEED button and switch on the power supply to the printer in order to start the self-test. The self-test prints out the printer settings and then the following, cuts off the paper and waits (the PAPER OUT LED will flash).

Self-test printout

Press the PAPER FEED button.

1. Press the FEED button to continue the printing process. The printer will print out a sample with the character set.
2. The self-test will end automatically and the paper will be cut off after the following line:

***** completed *****

The printer is ready to receive data as soon as the self-test has been completed.



NOTE:

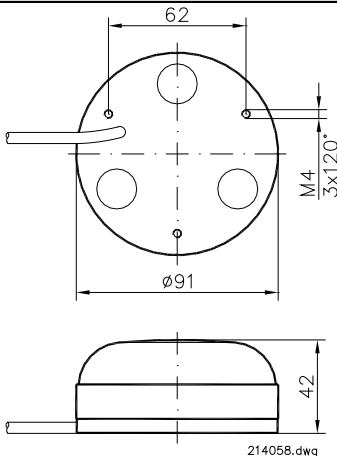
Press the FEED button if you want to interrupt the self-test manually. Press the FEED button again to continue the self-test.

14 GPS-Receiver (RS 232) type 6722-18

Order no.: 241920

Automatic supplier identification based on satellite tracking of vehicle location in conjunction with MAK 3003 system.

14.1 Technical data

Electrical data	
Auxiliary power	DC 6 ... 40 V
Typical power consumption	50 mA at DC 24 V
Receiver aerial	Inbuilt
Interfaces	RS 232
Electrical connection	5m of cable, open wire ends
Ambient conditions	
Operating temperature	- 30 ... + 80°C
Protection class	IP 67 (1 m immersion depth for 30 min)
Mechanical data	
Dimensions/mounting holes	
Mounting bolts	3 x M4, max. thread depth of 8.0 mm not to be exceeded (risk of breakage)
Weight	330 g incl. 5 m of cable

Wiring of GPS receiver 6722-18

See Compact Controller wiring page 11.

Connection

14.1.1 length of cable supplied with the product, 130 mm of insulation stripped from cable end.

Assignment:

14.1.1	Signal	+ DC 24 V	GND/Remote	RxD	TxD
	Colour	Red	Black/yellow	Blue	White

Fitting

14.1.2 The aerial is built into the receiver therefore the receiver must be fitted on top of the vehicle (e.g. on the rear cabin) and must be as horizontal as possible. The unit must never be covered by metal parts and must be able to "see" as well as possible in all directions on all sides.

15 GPRS modem with Magnetic antenna

- The modem housing (DGND) must not be in contact with the chassis. The modem is therefore installed with the insulation set.
- Please also check that the antenna adapter and antenna are unearthed.
- The components may only be installed and operated in non-hazardous areas!

15.1 GPRS Module, Type 6942-100

Order no.: 290337

Technical data

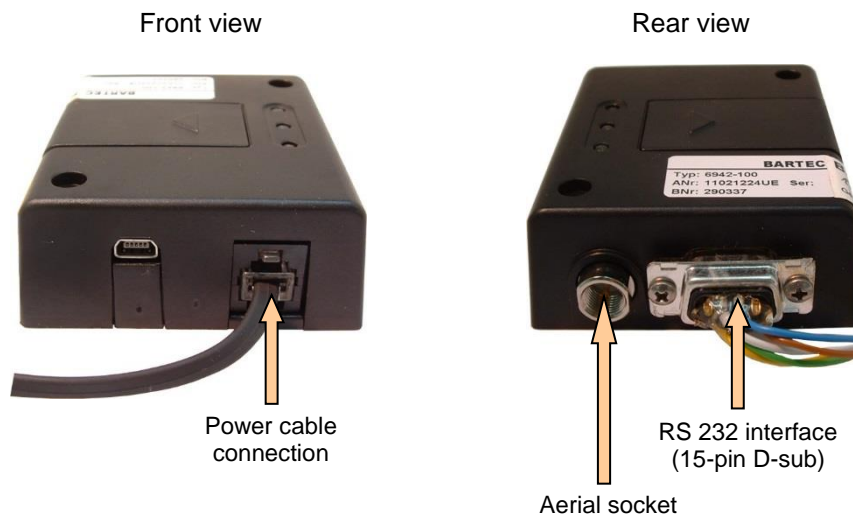
Operating voltage	DC 5 ... 36 V / approx. 83 mA at 24 V
Dimensions	77 x 67 x 26 (L x W x H)
Weight	Approx. 90 g
Fixing	Two M3x30 mm countersunk rounded-head screws on plastic
Operating temperature	- 30...+ 75 °C
Storage temperature	- 40...+ 85 °C

15.1.2

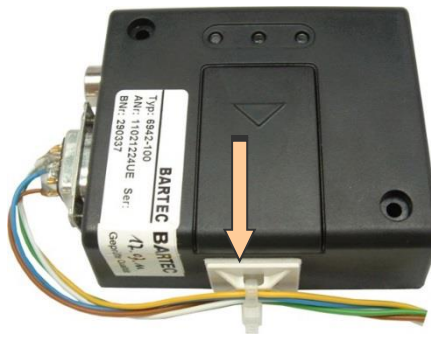
Connections



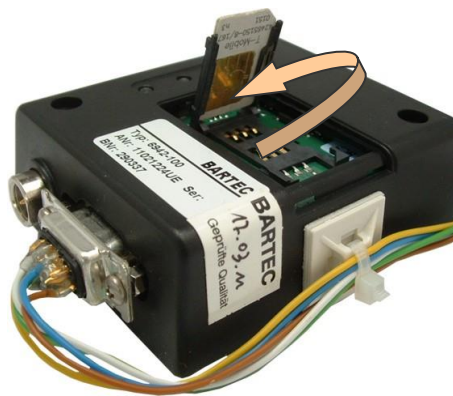
Attention:
The modem must be affixed with plastic bolts.



Inserting the SIM card



1. Open the cover.



2. Open the slot and insert the SIM card.

15.2 Magnetic antenna

Order no.: 360422

Ø 60mm / H: 13 mm

Antenna length: 5 m



Attention:

Fit the antenna in a location with good reception. The magnetic antenna may not be used in potentially explosive atmospheres.

First enter PIN in configuration then insert SIM card while the system is switched off.



15.3 SIM card specifications for the 3003 system

The following connections must be set up by the provider in order to guarantee efficient online support.

Service	Port	Description
SSH	22	Connection from 3003 system to office
SSH	22	Connection from office to 3003 system
HTTP	80	Connection from office to 3003 system
HTTPS	443	Connection from 3003 system to office
Ping		Connection from 3003 system to office

Additional options for office link-up via FTL and FTP (optional):

Service	Port	Description
FTP *1) (passive)	21 / all ports above 1023	Office link-up for MAK / PETRO and Petro 3003

Note:

The IMEI number of the modem must be activated and supported by the network operator/provider.

*1) FTP connections can also be protected via SSL. This is subject to the provider allowing FTP via SSL. Communications are then no longer in plain text but in SSL encryption form.

16 ULTRASAMPLER® sample collection system

16.1 Description

The ULTRASAMPLER® system is an automatic sampling system for milk collection vehicles in conjunction with the MAK 3003 milk intake and monitoring system.

The sample is taken "on line" during the milk intake and is always proportional to the volume flow rate.

If a dual pump system is used, it is possible to take individual samples and samples from the whole tank (GTP) at the same time.

There is a choice of manual to fully automatic infeed systems for the empty sample bottles.

There are bar code and transponder (TAG) systems for the sample bottle identification.

The following units belong to the ULTRASAMPLER sample collection system range:

- Sampler controller, type 6771-31
- Sampler pump, type 6871-x
- Flow level meter, type 6826
- Bottle drive, type 6774-10/6774-12
- Manual sample bottle feed, type 6871-3-30
- Semi-automatic sample bottle feed, type 6871-3-50
- Bar code reader, type 6727-40
- Bar code reading unit, type 6723-10, B series

The system configuration depends on the regulations in force in the relevant country and on the individual customer specifications.

- It is advisable to use the flow level meter (FLM) to increase the accuracy and representativeness of the sample, especially for milk quantities < 300 litres.

Position of the ULTRASAMPLER

The sampler pump and flow level meter are built into the milk pipeline on the collection vehicle and are flowed through by the milk taken into the collection vehicle.

The control unit is positioned at a suitable place near the sample collection system.

16. Systems with bottle drive for automatic sample bottle transport and sample bottle identification (bar code or TAG) are usually integrated in a closed refrigerator section.

The temperature of the refrigeration section is measured regularly by the MAK 3003 system and is recorded if it is above or below the stipulated limits.

Fig. 1 shows the position and arrangement of the Ultrasampler in the refrigerated sample collection box.

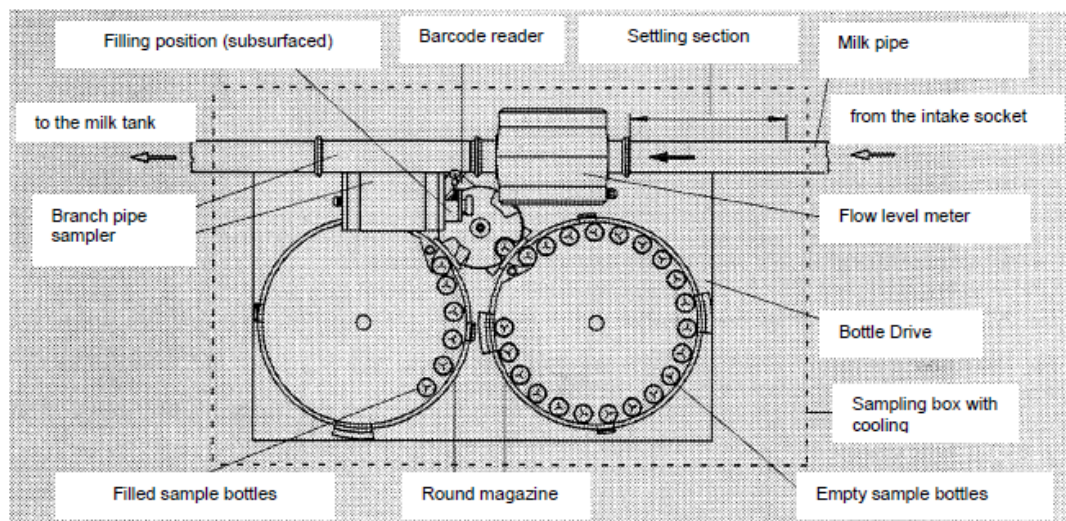


Fig. 1: Ultrasampler in the sampling box with cooling (plan view)

Mode of operation of the ULTRASAMPLER

Sample collection process

As soon as milk is taken into the collection vehicle, the sampler takes the sample in the branch pipe and pumps it into a correctly identified sample bottle waiting in position to be filled.

16. Before every milk intake, the control unit receives the input data from the MAK 3003 system so that it can determine the required pump output for the expected quantity of milk, the throughput of the collection vehicle and the number of samples to be taken.

The input data are used to calculate the available sample collection time and the resulting pump delivery rate of the sampler for the sample collection process.

If there is a facility to take samples from the whole tank (GTP) and if this function is enabled then, at the same time, a branch in proportion to the volume will be taken into the tank sample bottle from every supplier on a round.

Operation with flow level meter

If the ULTRASAMPLER has a flow level meter, the control unit receives a continuous stream of data from the flow level meter on the quantity of milk taken into the collection vehicle.

This enables high-precision control of the pump delivery rate subject to the actual flow rate. If there is no FLM, the pump output is controlled by default parameters for the performance of the measuring system.

Sample bottle transport

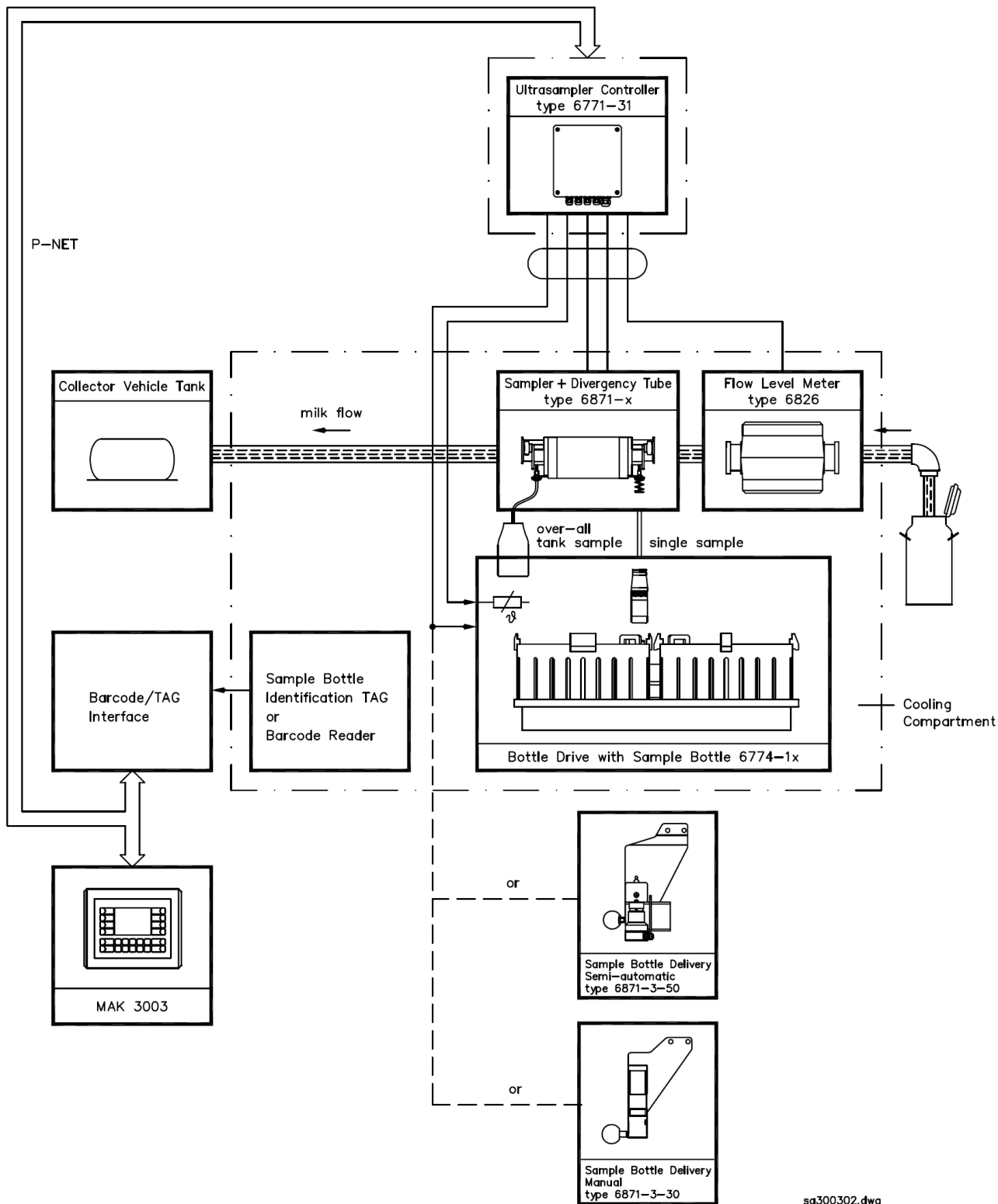
The control unit works with the MAK 3003 system in controlling and monitoring the automatic bottle drive.

Before every sample collection process, the bottle drive brings an empty sample bottle into the filling position under the sampler.

The sample bottle is identified beforehand by bar code or TAG. Faulty bottles are rejected without being used. After every sample collection process, the bottle drive sets the filled sample bottle down in a round magazine.

MAK 3003 matches the milk sample to the milk producer on the basis of the bar code or TAG, thereby ensuring that the data will be correctly attributed for the subsequent laboratory analysis.

Fig. 2 illustrates the flow of the data signals and control signals between the functional units of the ULTRASAMPLER and MAK 3003.



sa300302.dwg

Additional information about the ULTRASAMPLER

The sample collection is generally independent of the delivery quantity.

A minimum delivery quantity of between 20 and 40 l is required for the bottling of a usable sample, however, depending on the throughput of the intake system.

16.1.3

The MAK 3003 system can enable a pump output reduction on the collection vehicle to ensure that samples are also taken in the case of smaller delivery quantities.

The intake time will increase in proportion to the decrease in throughput.

The time for the sample to be taken by the ULTRASAMPLER will then also be longer.

MAK 3003 decides on an appropriate reduction on the basis of the expected delivery quantity (= input data).

How the system works in practice depends on the design of the collection vehicle.

Efficient sample collection

A special rinsing process in the sampler before every sample collection process largely prevents any residual milk in the sampling line from being carried into the new sample bottle.

At the start of the milk intake process the sampler pumps milk out of the branch pipe towards the sample bottle until the milk working point reaches the sampler exit.

The sampler then reverses the pumping direction and pumps milk and rinse residues back into the branch pipe.

Excess quantities in sample collection process

If the delivery quantity exceeds the specified amount by a set percentage (e.g. 20 %), the sample collection process will be stopped.

The sample bottle will also contain, e.g. 20 %, more liquid at this time than the configured nominal value (e.g. 35 ml).

MAK 3003 relays a message for the operator at the end of the milk intake process reading "Full".

Overfilling can be avoided by comparing the expected delivery quantity with the actual delivery quantity and, if there are major discrepancies, by adjusting the delivery quantity manually on the MAK 3003 system before the milk intake process starts.

Installing a flow-calming section

A flow-calming section is to be incorporated in the milk pipeline upstream of the flow level meter with a minimum length of five times the nominal width.

If the system is operated without a flow level meter, this flow-calming section should be positioned upstream of the sampler.

Pockets of air which falsify the flow level meter readings and which affect the sampling process are largely eradicated by the flow-calming section.

16.2 ULTRASAMPLER®-Controller type 6771-31

Order no.: 242222



Control unit for the ULTRASAMPLER® sample collection system with high-performance stepper motor for individual samples (supplier samples).

Technical data

16.2.1 Electrical data	
Auxiliary power	
Operating voltage	DC 24 V / 250 mA, (16 - 35 V), from cut-in unit, reverse polarity protection
Fuse Si1	1 A (medium time-lag)
Operating voltage for bottle drive	+24 V on-board power supply, fuse Si 5 = 1.0 A
Operating voltage for I/O logic circuit	+24 V on-board power supply, fuse Si 6 = 10 A
Control unit for sampler motor for individual samples	
Operating voltage	DC 44 V (internally generated from DC 24 V)
Fuse Si7	3 A
Maximum stepping frequency	10 kHz (corresponds to 25 rev/sec. at 400 steps)
Control unit for sampler motor for whole tank samples	
Operating voltage	24 - 30 V
Fuse Si2	3.15 A (medium time-lag)
Maximum stepping frequency	10 kHz (corresponds to 25 rev/sec. at 400 steps)
Interface 1 (interface 2 not activated)	
Fieldbus interface (P-NET)	Serial, asynchronous RS 485, P-NET ID no. 5941



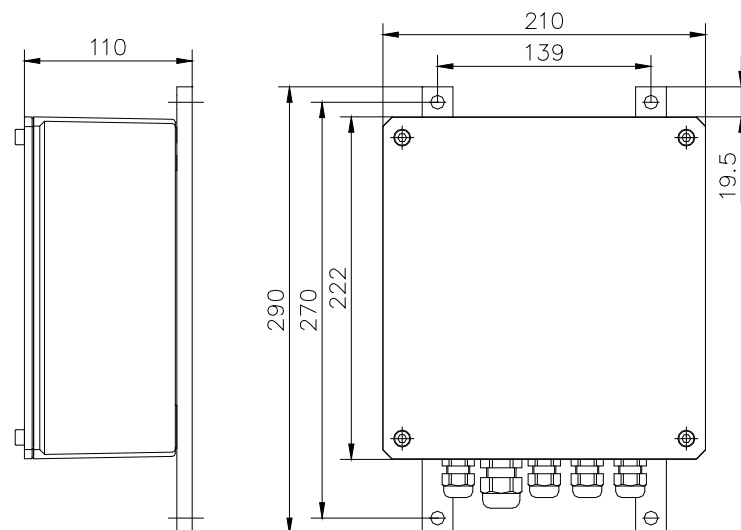
Important information!

Failure to heed this information will lead to the destruction of the unit!

The power supply, terminal 52/53, must be routed via the main switch of the data logging system. If the data logging system is not in operation, the power supply must be interrupted.

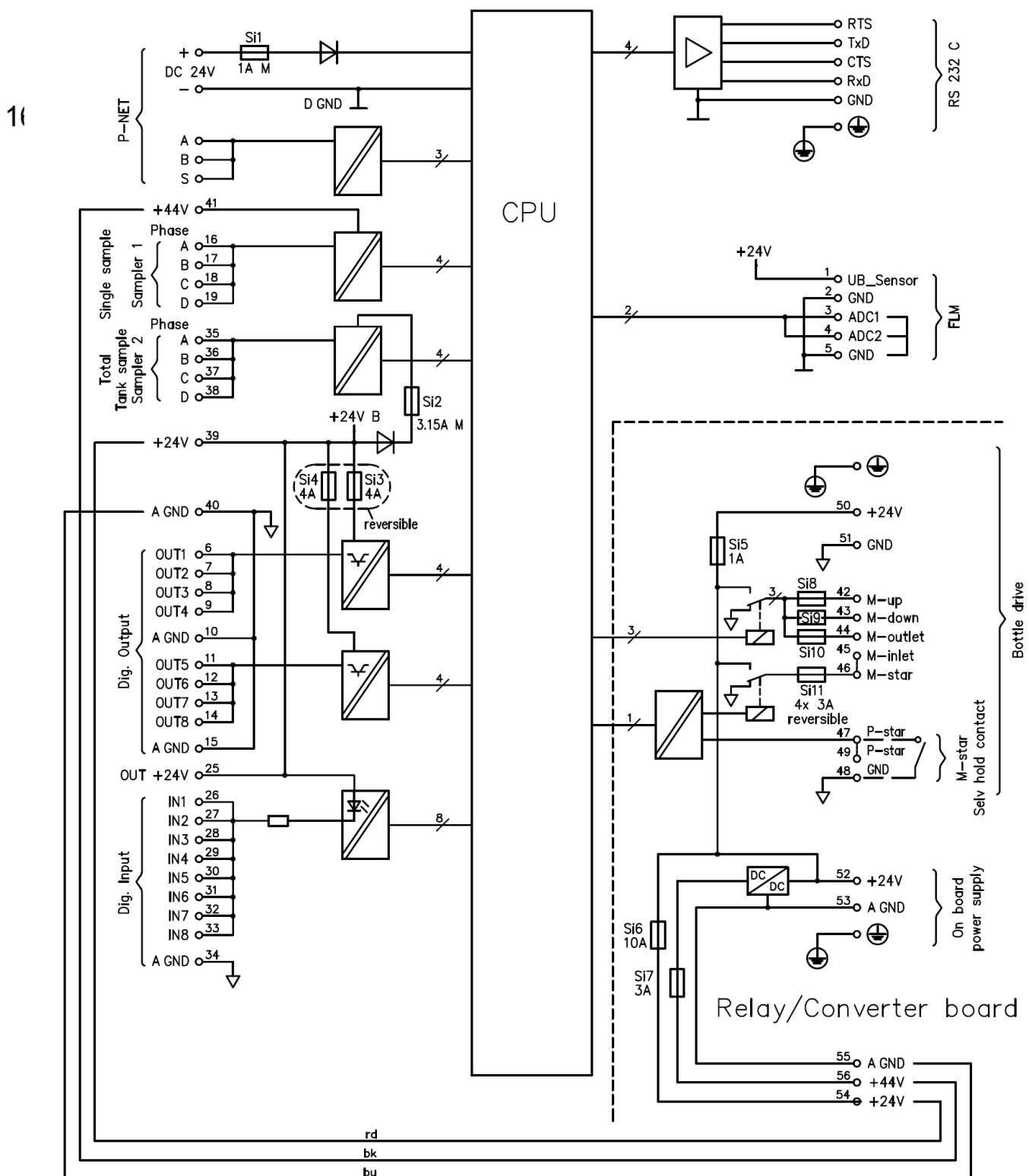
Ambient conditions	
Climate class/protection type	IWFN / IP 65
Operating temperature	- 10 ... + 50 °C
Storage temperature	- 20 ... + 70 °C
Digital outputs	
Number	8, OUT 1 - 4 / OUT 5 - 8, each fitted with reversible 4 A fuse (Si3, Si4)
Logic circuitry	FET switch, positive to on-board power supply + 24 V
Switching current	Max. 1 A DC per output, short circuit-proof
Relay outputs (bottle drive)	4 (24 V on-board power supply), each fitted with reversible 3 A fuse (Si8, Si9, Si10, Si11)
Digital inputs	
Number	8
Input resistance	2.2 K Ω (IF \leq 10 mA/DC 24 V)
Logic circuitry	To on-board power supply GND
Counter inputs for temperature sensor and milk sensor of probe, type 6865-1/3	
Number	3 frequency inputs
f max.	25 kHz, (type 0 ... 20 kHz)
Operating voltage for type 6865-1/3	DC12 V, 100 mA
Flow level meter input (fill level/flow rate)	
Fill level	0 - 2.5 V (0 V \cong 100 %, 2.5 V \cong 0 % fill level)
Flow rate	4 - 20 mA (= FLM configuration)
Mechanical data	
Housing specification	Die-cast aluminium
Weight	Approx. 50 N = 5 kg

16.2.2 Dimensions



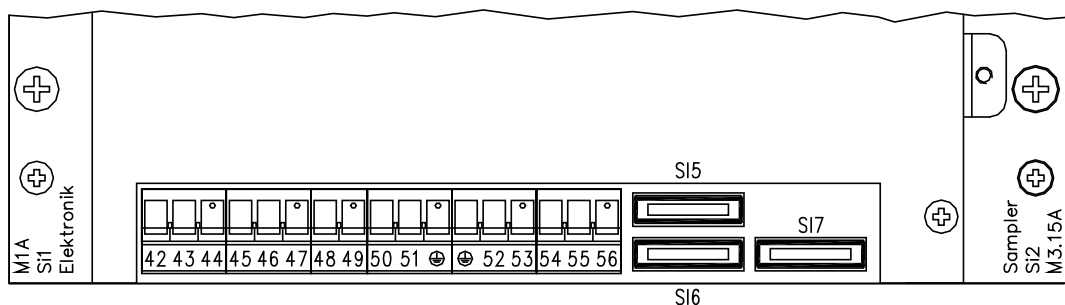
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Block diagram



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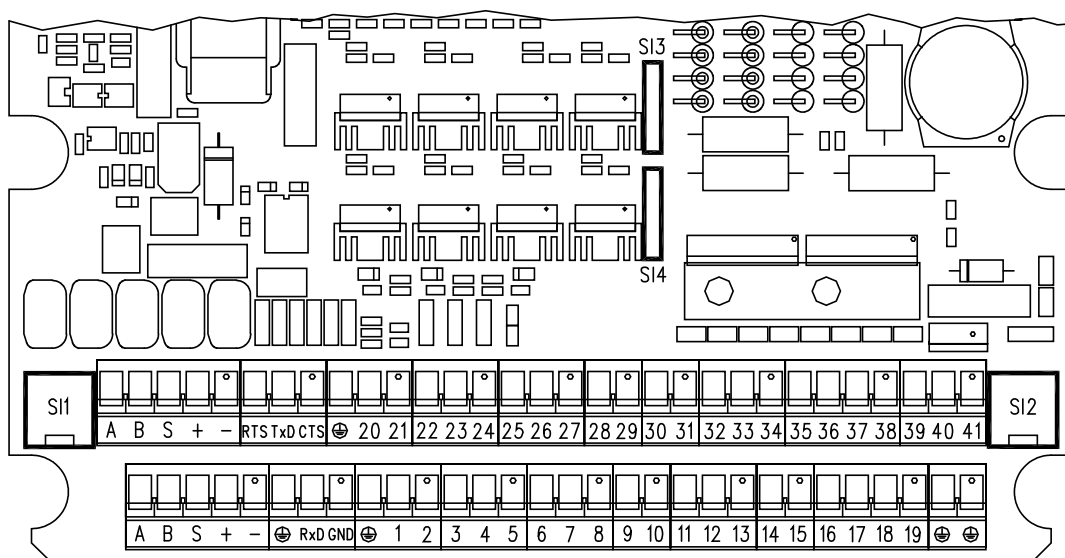
Position of fuses on relay circuit board/converter board



Fuse Si5 = 1.0 A
 Fuse Si6 = 10 A
 Fuse Si7 = 3 A

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Position of fuses on sampler circuit board



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Position of fuses

Fusible cut-out Si1 (1 AM) and fusible cut-out Si2 (3.15 AM) can be accessed by opening the respective fuse holder.

Si3 and Si4 are reversible fuses which are ready for use again after a short cooling time after a case of overload has been remedied (do not need replacing!).

Terminal connection plan

Terminal	Signal name	Colour	Connected to
A (2x) B (2x) S (2x) + (2x) - (2x)	P-NET A fieldbus P-NET B fieldbus P-NET S fieldbus +24 V supply from cut-in unit 0 V supply from cut-in unit	yl gn bn pi/gr/wt Shield	P-NET ring P-NET ring P-NET ring P-NET ring P-NET ring
⊕	Frame ground for cable shielding		Cable shielding
RxD TxD CTS RTS GND	RS 232 C interface RS 232 C interface RS 232 C interface RS 232 C interface RS 232 C interface		Inactive Inactive Inactive Inactive Inactive
1 2 3 4 5	UB sensor (+24 V for FLM supply) UB sensor (GND for FLM supply) FLM fill level (0...2.5 V) FLM flow rate (4...20 mA) GND reference potential for fill level + flow rate	pi Shield yl vi bn/bk	Flow level meter (FLM) Type 6826 cf. 1)
6 7 8 9 10 11 12 13 14 15	Digital output OUT 1 Digital output OUT 2 Digital output OUT 3 Digital output OUT 4 Reference ground for OUT 1-4 Digital output OUT 5 Digital output OUT 6 Digital output OUT 7 Digital output OUT 8 Reference ground for OUT 5-8		As required As required As required As required As required As required As required As required As required
16 17 18 19	Sampler motor for individual sample, phase A Sampler motor for individual sample, phase B Sampler motor for individual sample, phase C Sampler motor for individual sample, phase D	bl bn/wt gn/yl gr/pi	Sampler motor for single sample
20 21 22 24	UB sensor (+12 V for probe) Frequency input 1 (milk temperature, cf. 3) Frequency input 2 (milk sensor, cf. 3) UB sensor (GND for probe)	gn wt bn yl	Inactive
20 23 24	UB sensor (+12 V for probe) Frequency input 3 (sampling cabinet temperature, cf. 3) UB sensor (GND for probe)	pi wt bl	Inactive
25 26 27 28 29 30 31 32 33 34	+24 V on-board power supply, auxiliary supply for sensor system Digital input IN 1 Digital input IN 2 Digital input IN 3 Digital input IN 4 Digital input IN 5 Digital input IN 6, bottle in position, cf. 2) Digital input IN 7, star in position, cf. 2) Digital input IN 8, bottle down, cf. 2) 0 V on-board power supply, reference ground for IN 1-8	bl Wire jumper pi/wt	As required As required As required As required As required Bottle drive P-Star (terminal 49) Bottle drive As required
35 36 37 38	Sampler motor for tank sample, phase A Sampler motor for tank sample, phase B Sampler motor for tank sample, phase C Sampler motor for tank sample, phase D	bl bn/wt gn/yl gr/pi	Sampler motor for whole tank sample

Terminal	Signal name	Colour	Connected to
39 40 41	+24 V on-board power supply from terminal 54 AGND on-board power supply from terminal 55 +44 V operating voltage for sampler motor for individual samples, supply from terminal 56	rd 1.5 mm ² bl 1.5 mm ² bk 1.5 mm ²	Sampler motor for whole tank sample
42 43 44 45 46 47 48 49 50 51 ⊕	Signal M-Up, bottle lifting motor Signal M-Down, bottle lifting motor Signal M-Out, magazine discharge motor Signal M-In, magazine infeed motor Signal M-Star, star drive motor Signal P-Star, self-holding contact for star drive Ground reference potential for P-Star signal Signal P-Star, check-back signal +24 V on-board power supply for bottle drive GND on-board power supply for bottle drive Shielded connection for bottle drive channel	bn rd ye gn pi vi gr/wt Wire jumper bk bn/wt	Bottle drive Wires according to colour for type 6774-10 IN 7 (terminal 32)
⊕ 52 53	Shielded on-board power supply connection +24 V on-board power supply entry GND on-board power supply entry		Vehicle battery+ Vehicle battery-
54 55 56	+24 V on-board power supply exit AGND on-board power supply exit +44 V operating voltage output for sampler 1	rd 1.5 mm ² bl 1.5 mm ² bk 1.5 mm ²	Terminal 39, sampler circuit board Terminal 40, sampler circuit board Terminal 41, sampler circuit board

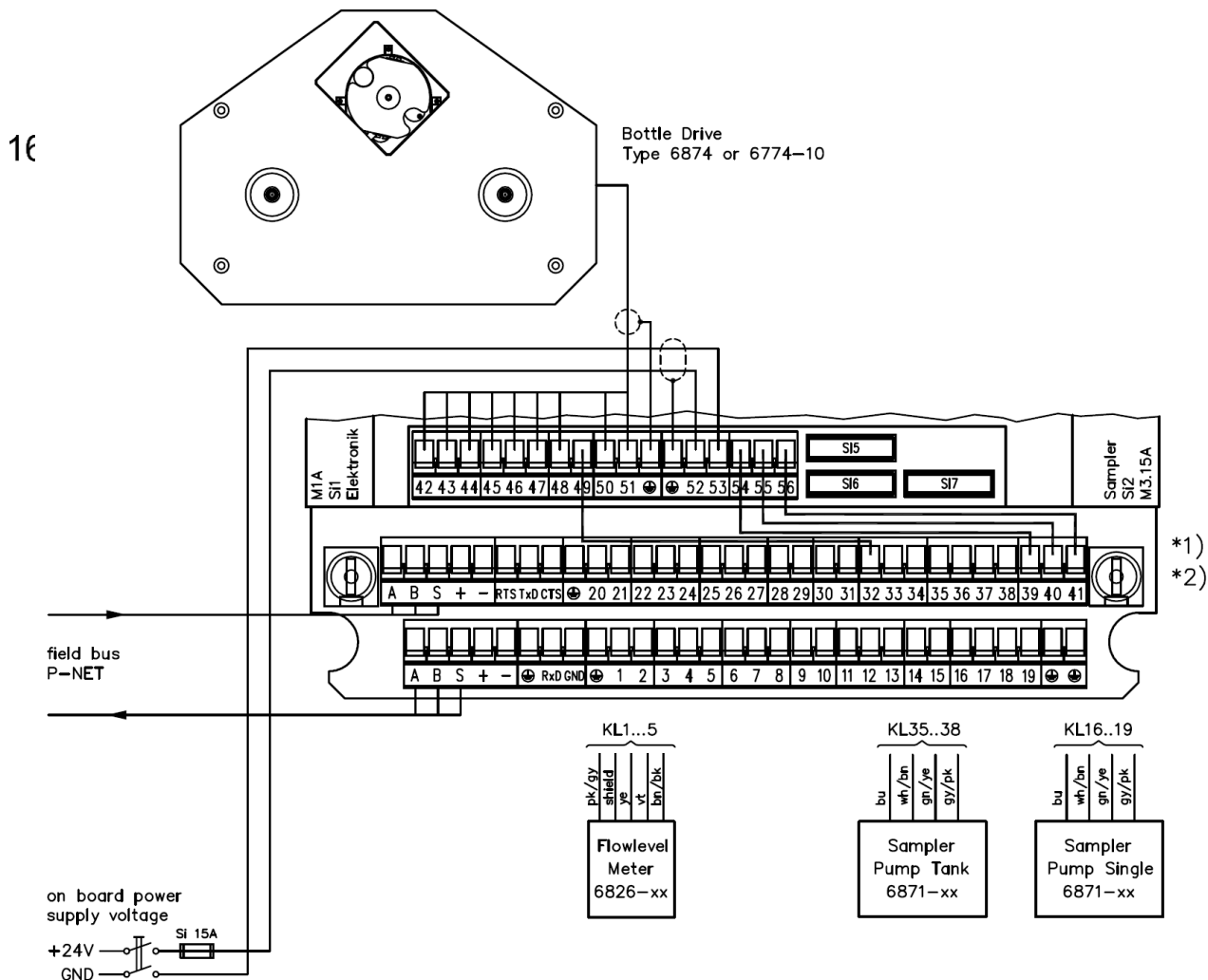
Notes:

1. Insulate other pigtail leads individually for FLM, type 6826 (rd, wt, bl); these are not needed.
2. The digital inputs IN 7 (star in position) and IN 8 (bottle down) are reserved exclusively for the bottle drive signals.
3. This is the standard assignment. Any configuration is basically possible.

Caution:

On configuration of "3003", input IN 6 is strictly reserved for "Bottle in position".

Wiring



Notice:

wire section for main power supply 2.5mm²
 admissible electricity of outputs max. 1.0A

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Additional instructions for wiring:

*1) The outgoing wires from terminals 54 (red), 55 (blue) and 56 (black) (= on-board power supply + sampler motor voltage) have to be connected to terminals 39 (red), 40 (blue) and 41 (black).

*2) For bottle drive operation, a wire jumper is needed between terminal 32 (IN7) and terminal 49 (P-Star).

16.3 Flow Level Meter type 6826-x


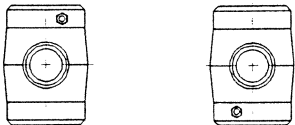
Order no.: see technical data



Technical data

Device-specific data	
16.3.1 Liquid to be measured	Milk
Fluid temperature	0 °C ... +100 °C
Pressure	Max. 10 bar
Electrical data	
Auxiliary power (voltage, electricity)	24 V DC ± 10 % max. 6 W
Volume flow rate	
NW 50	Max. 500 l/min
NW 65	Max. 1000 l/min
NW 76	Max. 1400 l/min
Direction of flow	As indicated on metal type plate (+ direction)
Sensors	Magnetic induction flow rate meter with μ P-controlled function monitoring; conductivity sensor for level measurement
Electrical outputs	
Magnetic induction flow rate meter	Analogue output 4 ... 20 mA
Fill level sensor	Analogue output approx. 0.3 ... 2.3 V
Electrical connection	5 m connection cable with PG-11 gland and internal terminals, open cable ends
Ambient conditions	
Operating temperature	-10 °C ... +50 °C
Maximum cleaning temperature	100 °C
Cleaning method	CIP
Climate class	IWA in acc. with DIN 40040
Mechanical data	
Dimensions	250 x 180 x 110 mm
Weight	Approx. 50 N (= 5 kg)

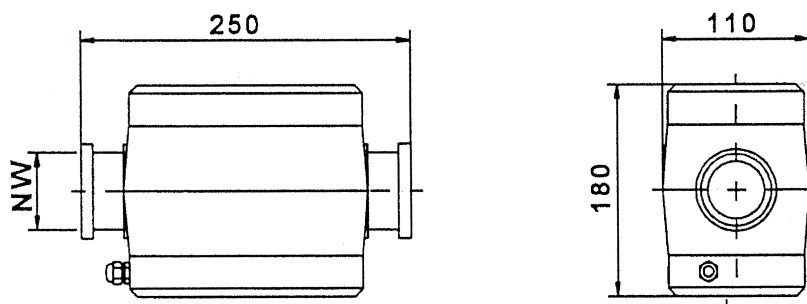
Pipe connections	
NW 50	Connecting flange, joined by seal ring and clamp in acc. with DIN 32676 NW 50
NW 65	Connecting flange, joined by seal ring and clamp in acc. with ISO 2852 NW 2.5"
NW 76	Connecting flange, joined by seal ring and clamp in acc. with ISO 2852 NW 3"
Build	Red Noryl PPO housing with stainless steel measuring pipe Stainless steel measuring pipe Teflon-coated
Installation	Measuring tube strictly horizontal, with upstream flow-calming section $\geq 3 \times \text{NW}$

Order details	
Designation	Order number
Horizontal installation (flat):	
Flow level meter 2", type 6826-10	U950 17 682610
Flow level meter 2.5", type 6826-20	U950 17 682620
Flow level meter 3", type 6826-30	302063
Installation position	
	
Vertical installation (on end):	
Flow level meter 2" 90°, type 6826-11	U950 17 682611
Flow level meter 2.5" 90°, type 6826-21	U950 17 682621
Flow level meter 3" 90°, type 6826-31	304782
Installation position	
	
NB: Note direction of flow (arrow on type plate)	

Accessories:	
Seal ring clamp 2"	U495077
Hinged clamp clip 2"	U495080
Seal ring clamp 2.5"	U495059
Hinged clamp clip 2.5"	U495056
Seal ring clamp 3"	U495031
Hinged clamp clip 3"	U495065

Dimensions/Installation

16.3.2



Fitting

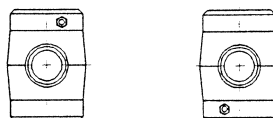
The flow level meter can either be laid flat or fitted upright depending on the design of the unit.

The milk pipe must always be horizontal.

Horizontal (flat) installation: order "Horizontal" version

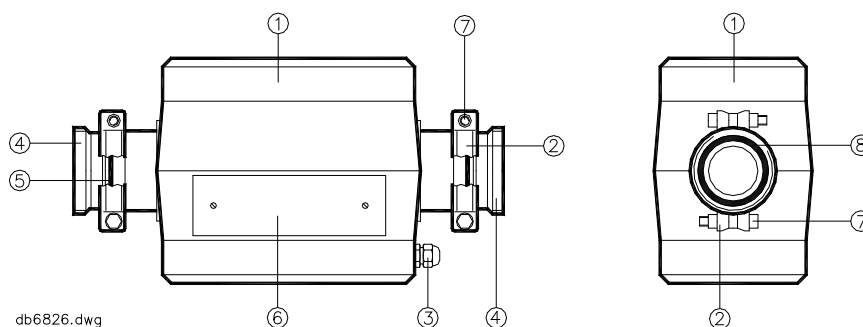


Vertical (upright) installation: order "Vertical" version



NB: Note direction of flow (arrow on type plate)

Build



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- | | |
|---------------------|------------------------|
| 1 = Cover | 5 = Flat gasket |
| 2 = Fastening clamp | 6 = Type plate |
| 3 = Cable feed | 7 = Hexagon head screw |
| 4 = Connection | 8 = Sealing ring |

Instructions for mounting and dismounting:

1. First remove threaded milk pipe adapter, if still attached to FLM. To do this, open the clamp fasteners (2) on both sides and remove the pipe connections from the FLM.

NB:

Do not lose the seals and put them back carefully when reassembling.

2. First screw the threaded milk pipe adapters with the union nuts on both sides of the pipe connections.
3. Then fit the FLM (not forgetting the flat gaskets (5)) and secure with the fastening clamps (2). It might be easier if the pipe supports/anchors are slightly loosened first. ⇒ Tighten again at the end.

Dismounting:

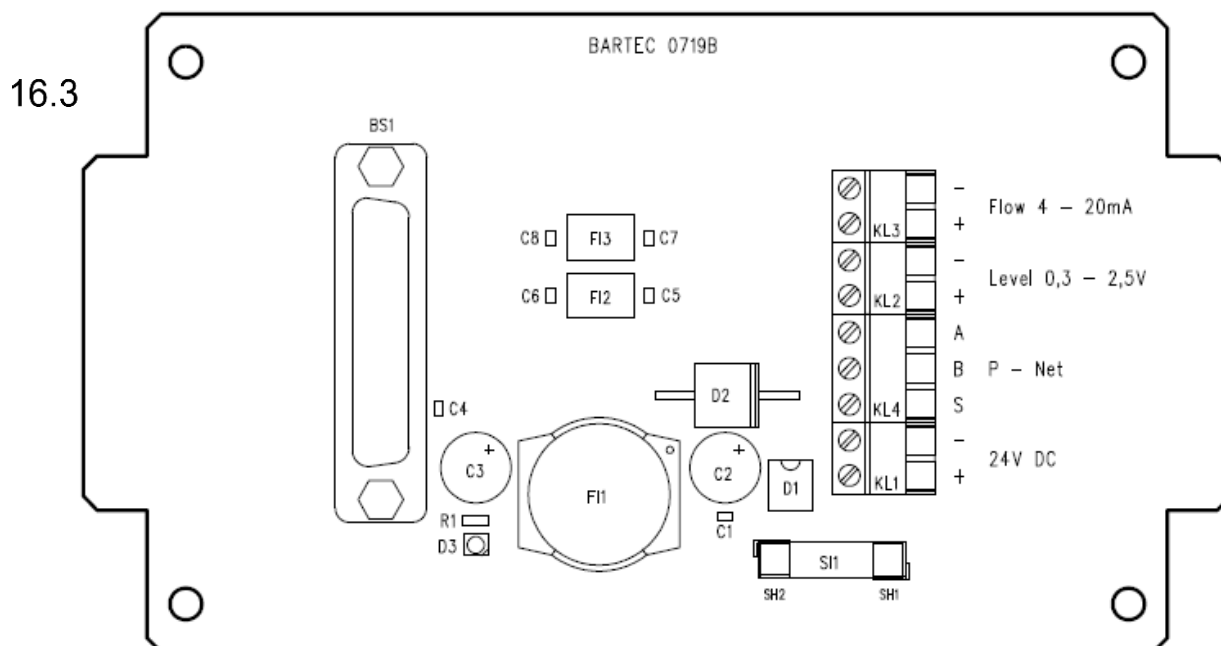
1. First take out the FLM by removing the fastening clamps (2) on both sides. It might be easier if the pipe supports/anchors are slightly loosened first.
2. Then, if necessary, remove the threaded milk pipe adapters from the FLM.

Caution:

Do not lose the seals and put them back carefully when reassembling.

Wiring

The FLM is supplied as standard with 5 m of cable which is connected as shown on the diagram below. Please follow the directions for use of the follow-on device when wiring.



16.3.4 Electrical terminal assignment

Terminal block	Signal	Colour	6771-31
3	- Flow 4 - 20 mA	bk	5
3	+Flow 4 - 20 mA	vio	4
2	- Level 0.3 - 2.5 V	bn	5
2	+ Level 0.3 - 2.5 V	ye	3
4	P-NET A	wt	Insulated
4	P-NET B	bl	Insulated
4	P-NET S	---	---
1	- 24 V DC (GND)	Shield	2
1	+ 24 V DC	pi/gr	1

Please insulate any non-required conductors individually.

16.4 Sampling cabinet monitoring sensor Pt 100 (optional)

Order no.: 216529



16.4.1 Technical Data

Electrical data	
Measuring insert	Pt 100 DIN EN 60 751
Tolerance class	B
Connection	Four-wire connection
Ambient conditions	
Operating temperature	-5 ... +100 °C
Mechanical data	
Housing specification	Stainless steel
Connecting cable	PVC / l = 5 m

16.5 Bottle drive, type 6774-10

Bottle drive with pneumatic lifting gear

Order no.: U9441677410

The bottle drive is a hands-free system for the delivery and positioning of the sample bottles for the ULTRASAMPLER® sample collection process and for the simple insertion and removal of the round magazines of type 6875.

It is located in the refrigerated sample collection box on the collection vehicle and holds the empty and full sample bottles in two round magazines.



Technical data

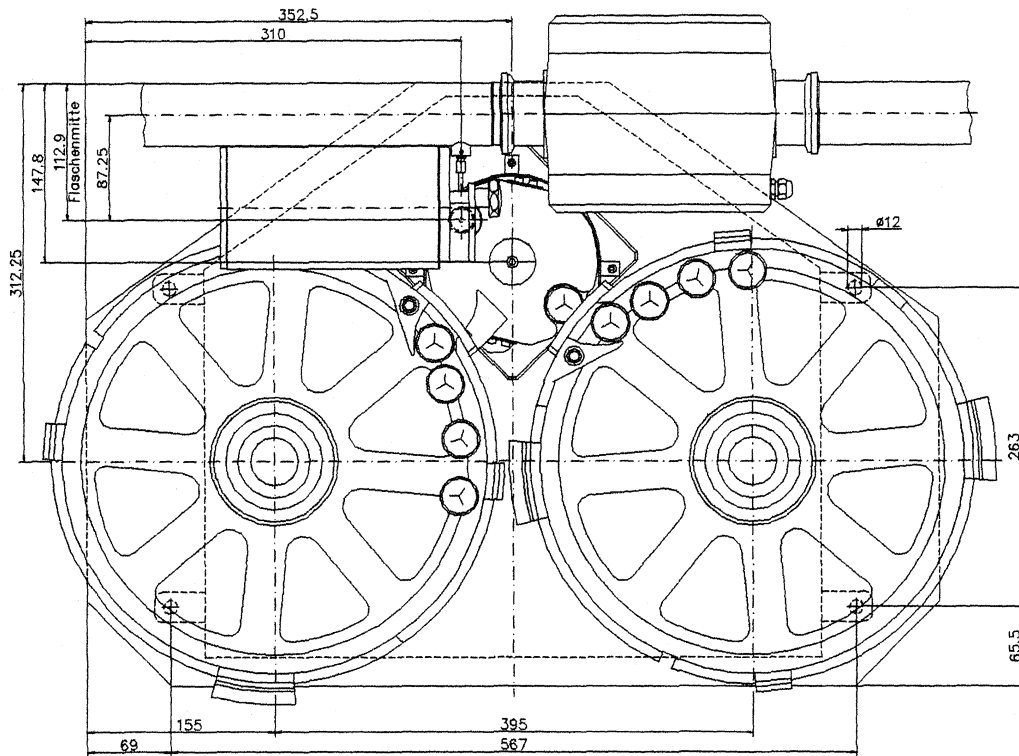
16.5.1

Electrical data	
Auxiliary power	DC 24 V
Fuses	No internal fuses, fused via drive system
Electrical connection	Connector plug with inset socket (F), type Han 16 A (16-pin)
Compressed air connection	Plug-in connection for hose with outer diameter of 5.0 mm (see connection diagram!), 10 bar max. pressure, oil-free
Ambient conditions	
Operating temperature	-10 ... +50°C
Storage temperature	-10 ... +70°C
Climatic category / protection class	JWA / IP 51
Mechanical data	
Housing specification	Stainless steel, plastic (POM)
Weight	28 kg (excl. round magazines)
Round magazine	Type 6875 with sample bottles type 6845: max. 72 sample bottles per magazine
code reader	Fitting facility for bar code reader, e.g. type 6834-10 6727-40 (not supplied with the product)

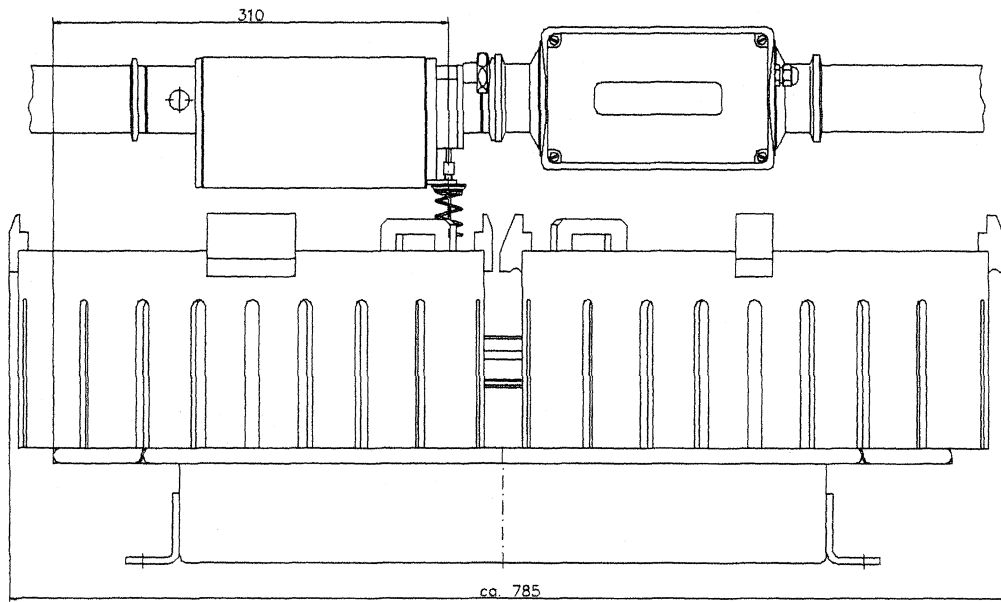
Dimensions/Mounting

View from above

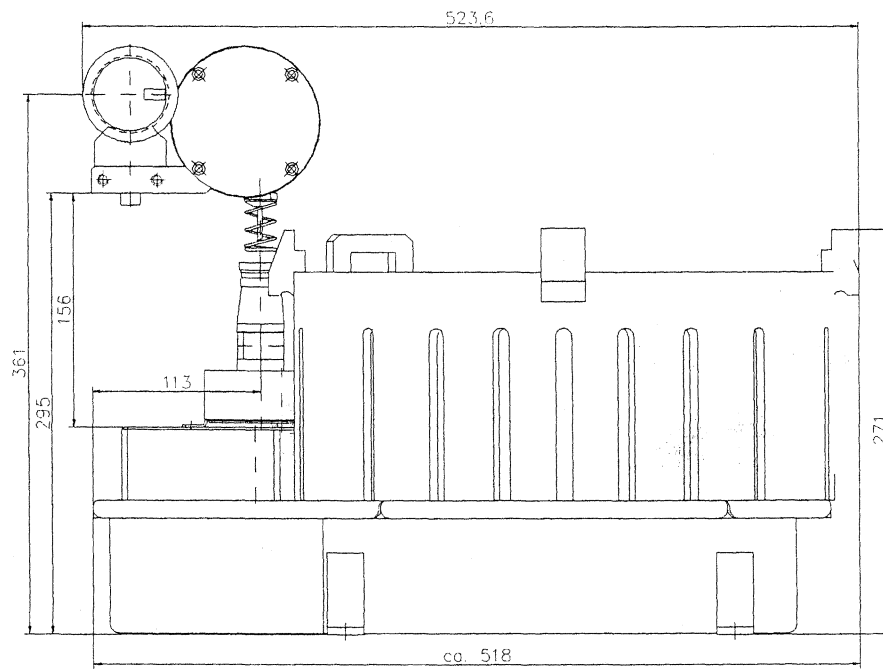
16.5.2



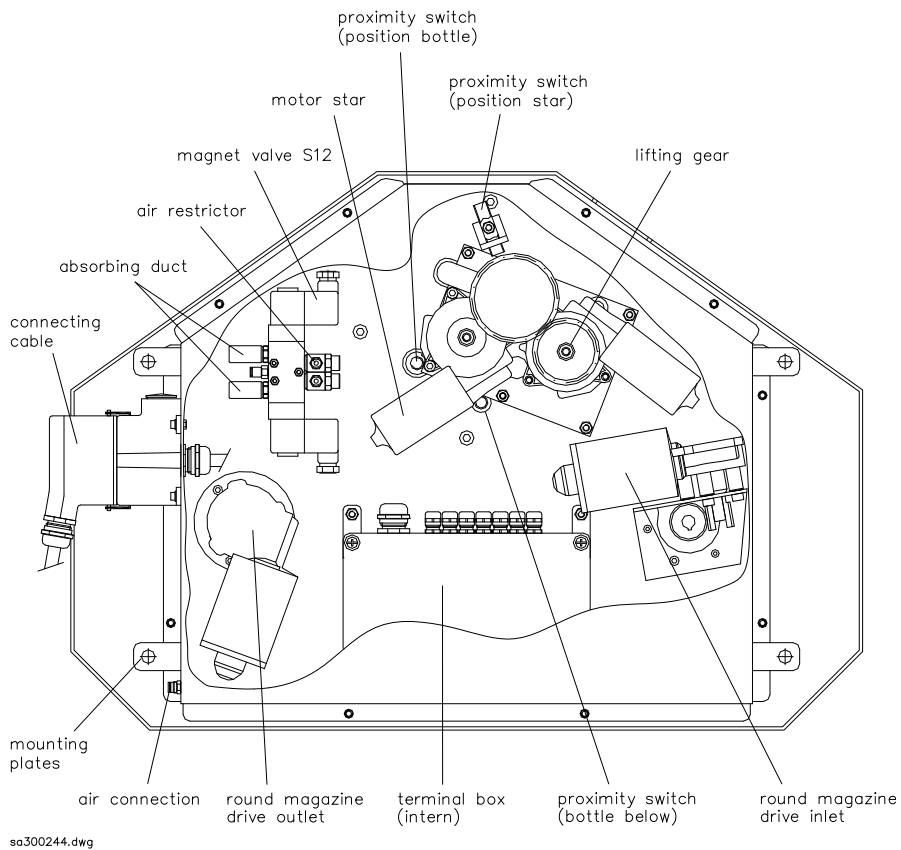
View from the front



View from the left



View from below



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Installation

Installation

Installation

Horizontal, with reference to the position of the ULTRASAMPLER®.

16.5.3

It must be possible to change the round magazines easily afterwards (see diagram).

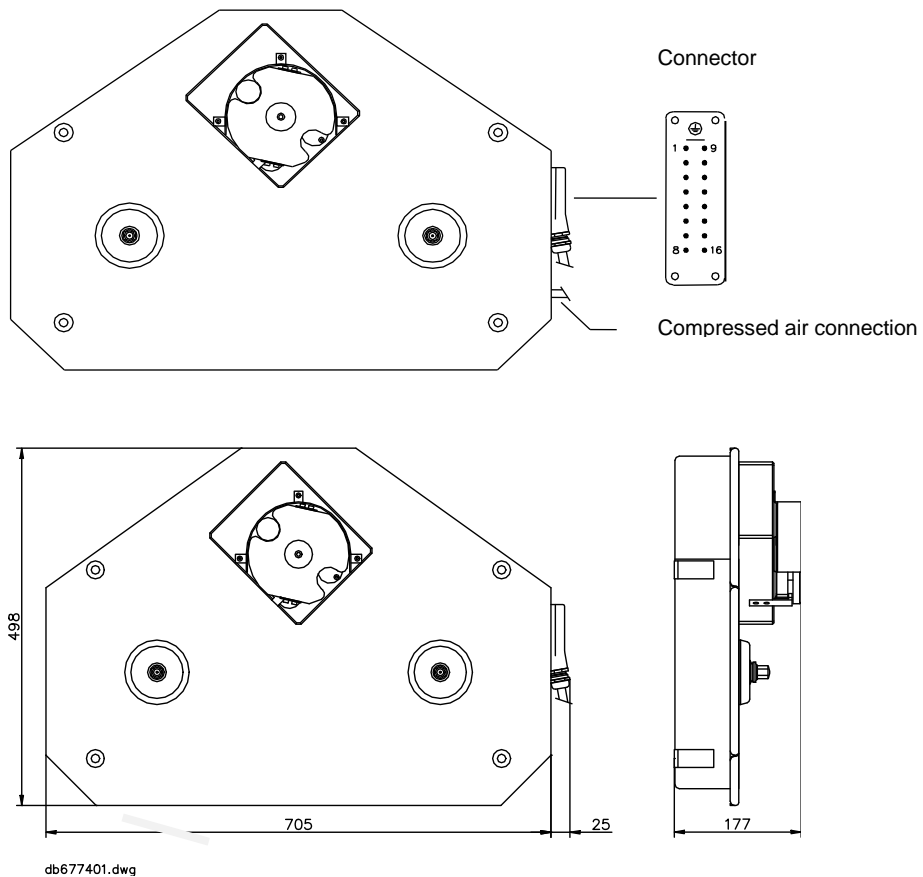
Connection

Establish compressed air connection (see diagram!).

Wiring

Connect cable for bottle drive (type 6774-304, L = 7 m) to the relevant drive system.

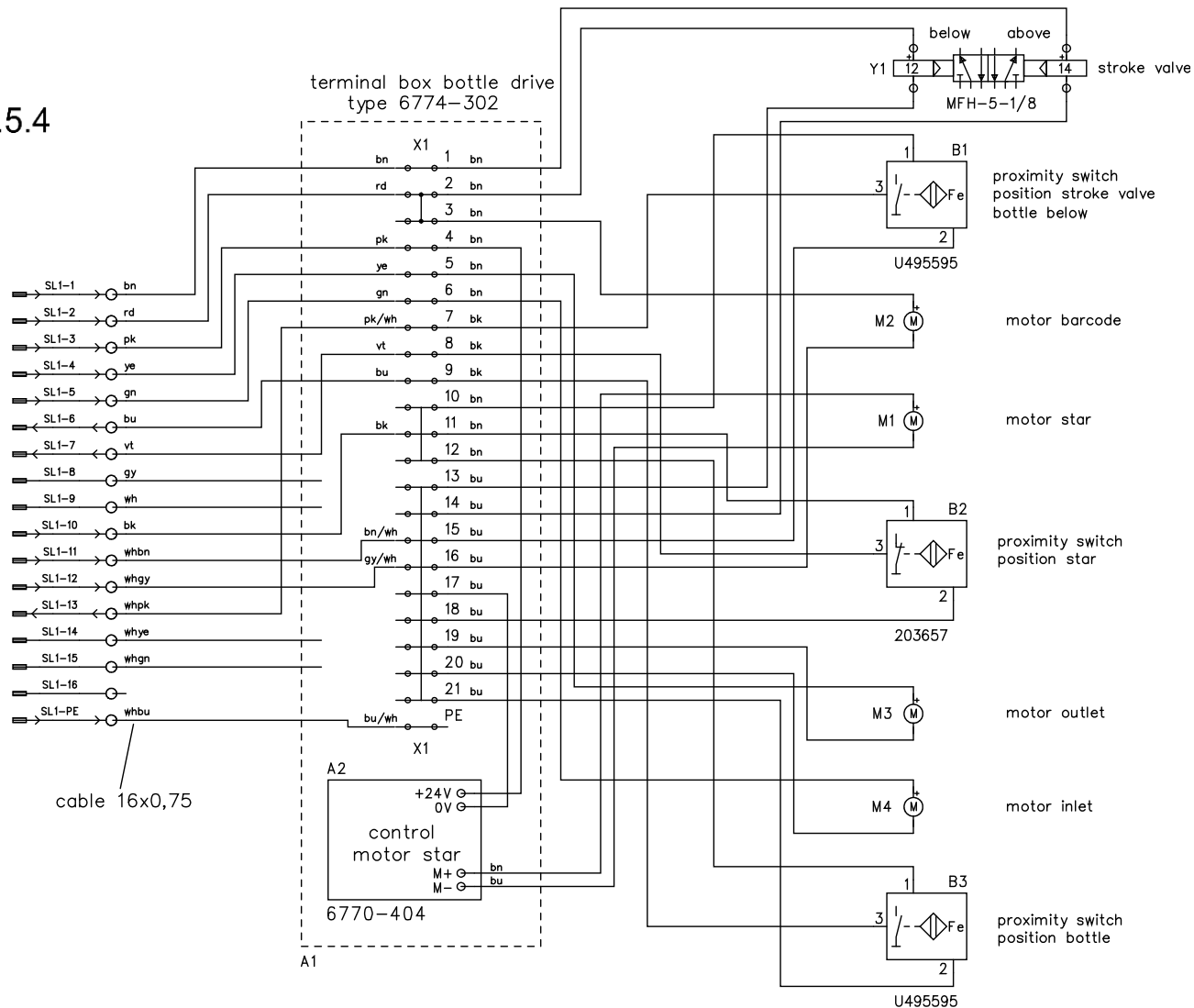
Dimensions and location of connections



Wiring/terminal assignment


Wiring internally

16.5.4



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Terminal assignment

		I/O-Box type 6753	Ultrasampler Controller type 6771-31	PIN
Signal	Wire colour	Terminal	Terminal	
Stroke valve (motor up)	bn		41	BL1-1
Motor barcode (motor down)	rd		42	BL1-2
Motor star	pk		45	BL1-3
Motor outlet	ye	free output	43	BL1-4
Motor inlet	gn		44	BL1-5
Position bottle	bu	free input	26	BL1-6
Position star	vt		46	BL1-7
nc	gy			BL1-8
nc	wh			BL1-9
+24V	bk	+24V *	49	BL1-10
0V	whbn	0V *	50	BL1-11
0V	whgy	0V *	47	BL1-12
Position stroke valve (bottle down)	whpk		33	BL1-13
nc	whye			BL1-14
nc	whgn			BL1-15
				BL1-16
Housing	whbu			BL1-PE

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nc = not connected

* 24V main power supply

16.6 Bottle Drive Mini (max. 16 bottles) type 6774-12

Order no.: 362272

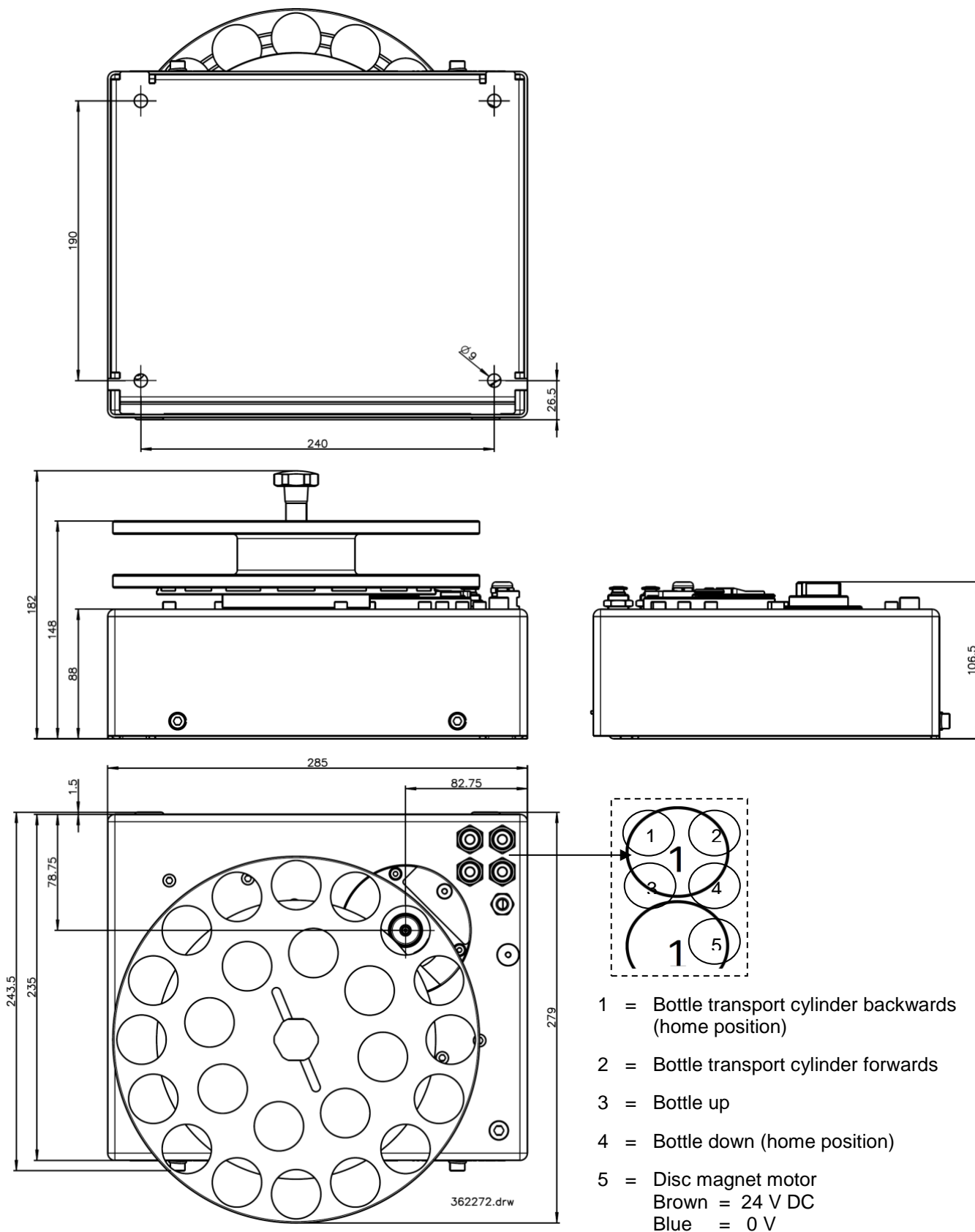


Technical Data

16.6.1

Device-specific data	
Number of sample bottles	Max. 16 (optional capacity for 8 spare bottles)
Barcode reader	Fitting facility for bar code reader, e.g. type 6727-40 (not supplied with the product)
Connection cable	7 m oil resistant flexible cable, 2 x 0.75 mm ²
Input voltage	24 V DC, must be conducted via relay with freewheeling diode
Fuses	No internal fuses, approx. 3 A, must be fused via drive system
Pneumatic supply	Plug-in connections for pneumatic hose with 6 mm outer diameter
Ambient conditions	
Operating temperature	-10 °C ...+50 °C
Storage temperature	-10 °C ...+70 °C
Protection class	IP 20
Mechanical Data	
Dimensions	285 x 279 x 170 mm (incl. bottle holder) 285 x 243.5 x 106.5 mm (excl. bottle holder)
Mounting holes	4 x diameter 9 mm, 240 x 190 mm
Weight incl. bottle holder	Approx. 6 kg
Weight of bottle holder	Approx. 1,1 kg
Housing specification	Stainless steel, plastic (POM)
Bottle holder	Type 6774-306 for 16 sample bottles (Optional capacity for 8 spare bottles)
Spare parts and accessories	
Designation	Order number
Holder for 16 bottles, type 6774-306	362571
Magnetic holder, type 6774-305	362535
Plastic hose PAN 6 x 1,00 mm (silver)	306004

Dimensions and Assembly



Note:

When de-energized the bottle transport cylinder must be retracted, the star can be turned by hand counter-clockwise! If the cylinder is extended, it clacks loud when turning the star counterclockwise.

16.7 Installation

Fitting the refrigerated sample collection box

Standards required of the refrigerated sample collection box

All the Ultrasampler units, except for the Controller, are located in a special refrigerated sample collection box.

16.7.1 This sample collection box has to be made to fit the Ultrasampler assembly and installed in the intake cable of the collection vehicle or another suitable location.

The following points need to be factored into the design and positioning:

- There must be space for the sampler and bottle drive in the sample collection box (Fig. 2, Fig. 3).
- The bottle drive is seated horizontally in the sample collection box and also needs to be kept horizontal during its insertion and removal.
- It must be possible to insert and remove the round magazines of the bottle drive easily.
- The milk pipeline on the collection vehicle should be routed through the refrigerated sample collection box at an incline of $1 \pm 0.5 \%$ (towards the intake socket). There must be not be any mechanical forces on the connecting flanges either during assembly or during operation.
- It must be possible to fix the branch pipe with two holders on the cover of the sample collection box. The holders should sit on the branch pipe ends.

Fig. 1 - ULTRASAMPLER in refrigerated sample collection box

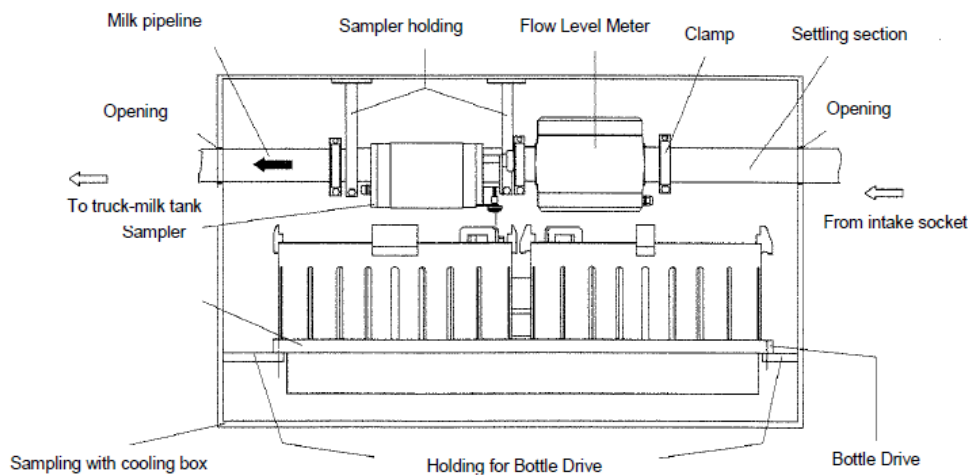


Fig. 2

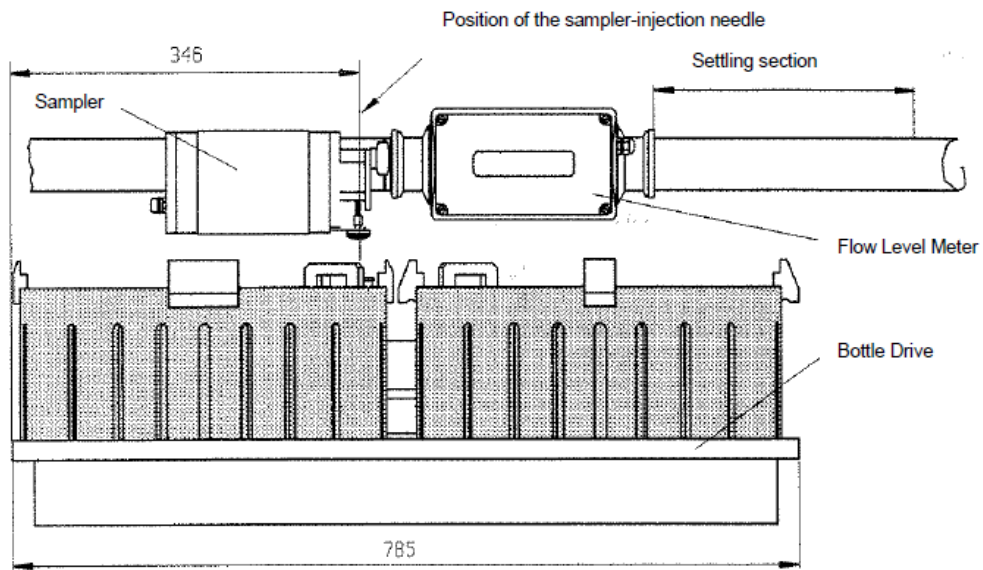


Fig. 3

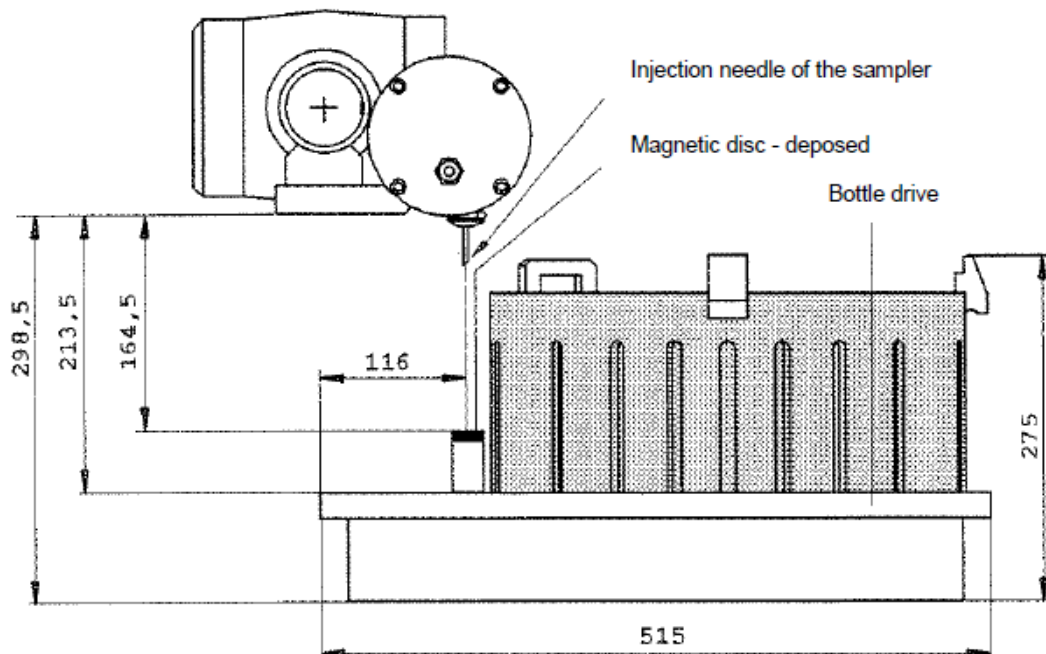


Fig. 2 and Fig. 3 show the dimensions for the sampler and bottle drive layout.

- A straight piece of milk pipe (length $\geq 3 \times \text{NW}$) serves as a flow-calming section upstream of the flow level meter.

The flow-calming section can extend out of the refrigerated sample collection box.

- There are four holes in the base plate of the bottle drive for connection with the sample collection box.

NOTE:

- When calculating the dimensions of the refrigerated sample collection box, take due account of the choice of sampler and the installation options.
- Allow for the possible use of a flow level meter with "vertical" installation position (installed horizontally in Fig. 2 and Fig. 3).

Fitting the milk pipeline

The branch pipe of the sampler and the flow level meter are integrated in the milk pipeline in the sample collection box.

Duly allowing for the space required by the sampler and bottle drive, the milk pipeline must be disconnected at the place designated for the branch pipe and flow level meter (or must be assembled from individual pipe sections).

The exact position and length of the disconnection must be decided when the sample collection box is being designed.

A connecting flange (standard part) of the corresponding width must be welded onto both ends of the milk pipe at the disconnection point.

If the milk pipeline is fitted outside the sample collection box, there must be axial clearance for the installation and removal of the sampler and flow level meter when it has been released. The aim is to install the sampler firmly in the sample collection box in a vibration-free location.

16.7.2 Installation of the ULTRASAMPLER units

Installation of sampler type 6871-3/4/5

The sampler and branch pipe can be installed and removed either as two separate units or as one unit screwed together.

Installation of branch pipe:

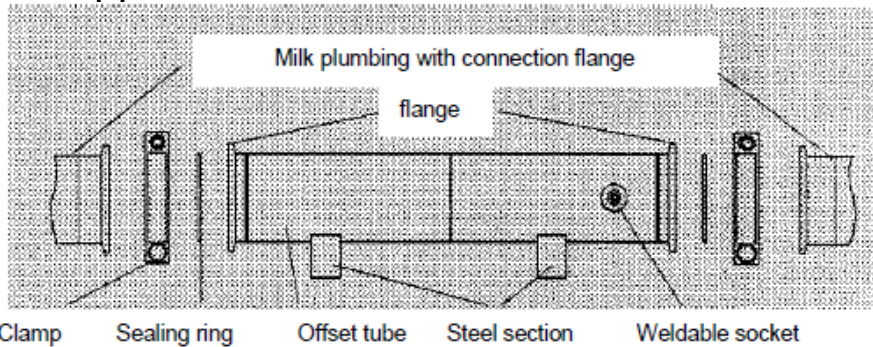
- Fit sealing rings on the flanges of the branch pipe.
- Mount the branch pipe on the milk pipeline by the flanges on both sides (if using the flow level meter mount this on the flange on the corresponding side). Tighten fasteners slightly.
- Turn branch pipe until welded socket is horizontal. Tighten fasteners.



Note:

Do not turn the branch pipe until the sampler and bottle drive have been fitted in the exact position.

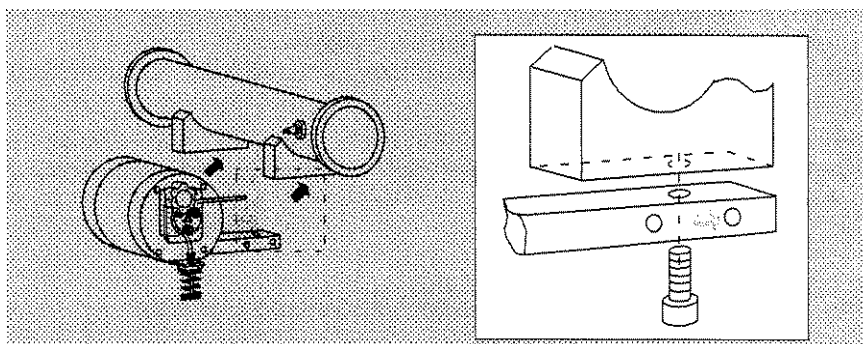
Sampler and branch pipe



Fitting the sampler on the branch pipe

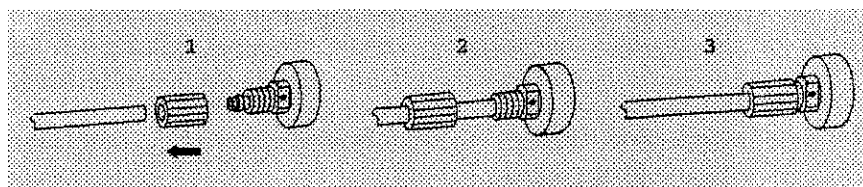
- Attach the two sampler holders to the steel sections of the branch pipe from below. Screw each of the holders onto the steel sections with an M8 x 20 hexagon socket screw.

Connecting the sampler and branch pipe



- Fit M6 x 0.75 union nut on the free end of the pump hose (1). Fit pump hose on intake cannula in welded socket (2) and tighten union nut (3).

Connecting pump hose to intake cannula



Additional fixation of branch pipe

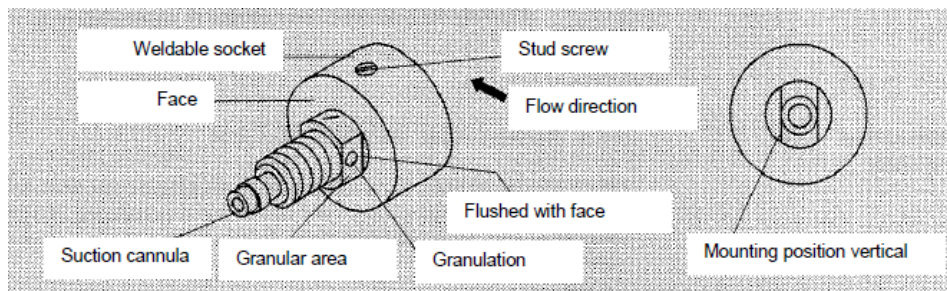
Additional holders need to be fitted on the ends of the branch pipe and connected to the cover of the sample collection box.

These holders should be easy to take off again when the branch pipe is removed.

Check the fitting of the intake cannula in the welded socket with reference to the following points:

- Rough area pointing against the direction of milk flow (rough area and opening of intake cannula pointing in the same direction).
- The roughened surface is upright.
- The roughened surface is flush with the end face of the welded socket.

Intake cannula in welded socket



Deinstallation of sampler type 6871-3/4/5

As with their installation, the sampler and branch pipe can be removed together as one unit or one after the other.

It is possible and quite straightforward to replace the sampler without removing the branch pipe from the milk pipeline.



Caution:

Never remove the sampler or branch pipe while the collection vehicle is running and the MAK 3003 LYNX system is switched on!

Removing the sampler

- Undo union nut on intake cannula and detach pump hose.
- Unplug sampler connection cable.
- Unscrew and remove the two M8 x 20 pan head screws on the underside of each sampler holder and remove sampler.

Removing the branch pipe (with or without sampler)

- Undo the fittings holding the branch pipe on the cover of the sample collection box.
- If the sampler is also being removed, unplug the sampler connection cable.
- Loosen additional milk pipe restraint outside the sample collection box (where fitted) until the milk pipeline has some side clearance.
- Remove fasteners from the branch pipe flanges and remove branch pipe (with or without sampler).

Installation of flow level meter, type 6826

The flow level meter sits between the branch pipe of the sampler and the flow-calming section and is mounted on both sides.

The milk taken into the collection vehicle flows through the flow level meter first and then through the sampler. See section 16.3.2. for installation instructions.



Note:

Mount the flow level meter in such a way that the terminal box remains accessible.

If space is limited, fit the connection cable before installing the meter.



Caution:

Never remove the flow level meter while the collection vehicle is running and the MAK 3003 LYNX system is switched on!

Demontage Flow Level Meter Typ 6826

Removing the flow level meter

- Undo any locks on the milk pipeline outside the sample collection box (to generate axial play).
- Disconnect the connection cable.
- Undo the flange fasteners and take out the flow level meter.

Installing the bottle drive

- Fit bottle drive in refrigerated sample collection box.
- Plug connection cable in first if necessary because of space constraints.
- Screw down bottle drive with four M6 screws and protect screw fittings.
- Loosen branch pipe fasteners. Turn branch pipe with sampler until the tip of the injection needle is pointing to the centre of the magnetic disc. Tighten fasteners again.

Removing the bottle drive

- Undo the four M6 screws. Remove the bottle drive.
- Unplug the connection cable before or after the removal process depending on space constraints.

Fitting the manual sample bottle lifter

Type 6871-3-30

The manual sample bottle lifter, type 6871-3-30, is screwed onto the holder of the sampler, type 6871-3/4/5, which is on the pump side.

The connection is made with two M8 x 15 pan head screws and lock washers.

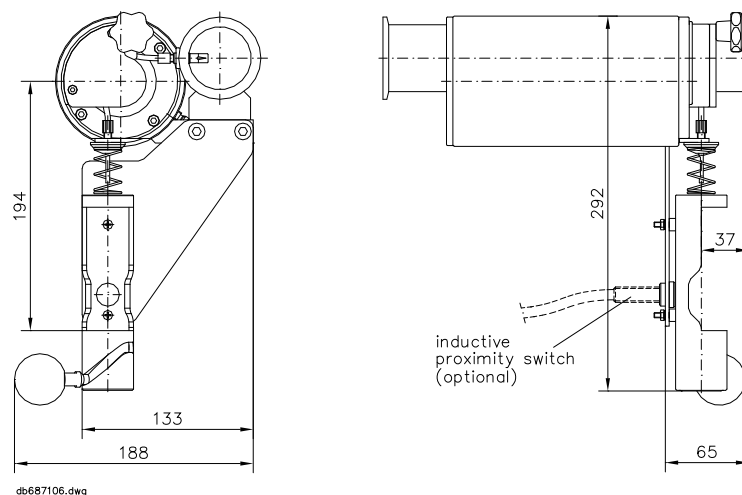
The sampler can be fitted alone or connected to the branch pipe.

The sampler and branch pipe can be fitted in the sample collection box or left unfitted.

Assembly with proximity switch:

Screw proximity switch into manual sample bottle lifter as far as it will go and fit locknut.

Dimensions of manual sample bottle lifter



Installation of a suction power reduction

If milk quantities below 40 l are assumed, the sampling time may not be sufficient to fill the sample bottles sufficiently.

In order to ensure a satisfactory filling quantity here too, the time for the milk intake and thus the sampling time must be increased by reducing the suction power of the milk intake system.

Based on the expected delivery quantity (delivery quantity is part of the default data), the MAK 3003 decides whether to activate this suction power reduction.

Depending on the construction of the collection vehicle, there are various options for technical implementation.

16.8 Maintenance

The pump hose on the sampler needs to be changed periodically otherwise the only maintenance required on the ULTRASAMPLER is to clean the inside and outside.

The intake cannula or injection needle may need to be replaced if damaged.

Cleaning the inside and outside of the ULTRASAMPLER

Cleaning the outside of the ULTRASAMPLER

- 16.8.1
- Wipe down the outside of the functional units of the ULTRASAMPLER with a damp sponge without any added detergents.
 - The round magazines of the bottle drive can be cleaned in a water bath under the following conditions:
 - Max. cleaning time: 5 minutes once a week
 - Max. cleaning temperature: 50 °C
 - Cleaning method: Water bath (circulated)

Cleaning the inside of the ULTRASAMPLER

The parts requiring cleaning in this case are the surfaces in the branch pipe and in the flow level meter contacted by the milk, and this internal cleaning routine is included in the collection vehicle cleaning process.

Parallel to this, the sampling line of the sampler is rinsed down in a special ULTRASAMPLER cleaning cycle.

During this cycle, the sampler pumps an alkaline cleaning solution out of the branch pipe into the sample bottle.

How to start the cleaning cycle (subject to installation):

1. Select menu item CIP in the MAK 3003 software
2. Activate special switch for collection vehicle cleaning



Caution:

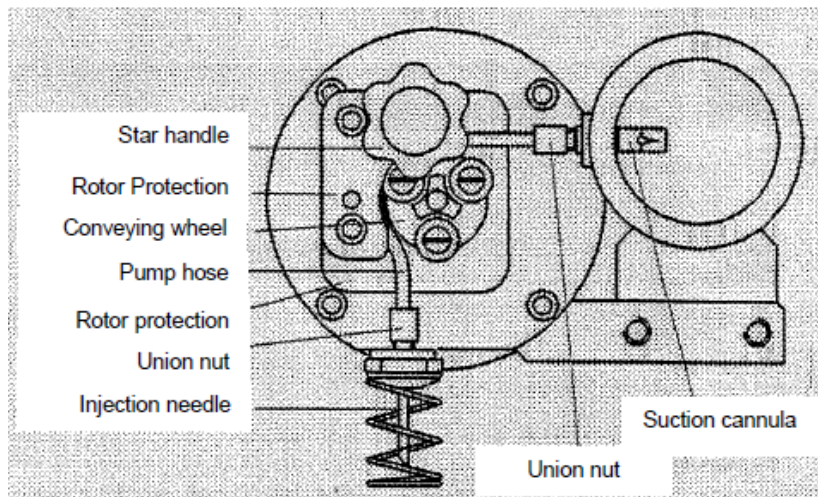
The quality and width of the pump hose are affected by the sampler cleaning process. This gradually lowers the amount put into the sample bottles. Ideally the pump hose should therefore be changed after each cleaning cycle but, failing that, after no more than 10 days.

Changing the pump hose

The pump hose can be changed at any time but not while the sampler is in operation.

Removing the old pump hose

- Undo star handle and remove rotor protection (Plexiglas).
- 16.8.2 • Unscrew union nut on injection needle and intake cannula.
- Take out old pump hose, remove union nut.



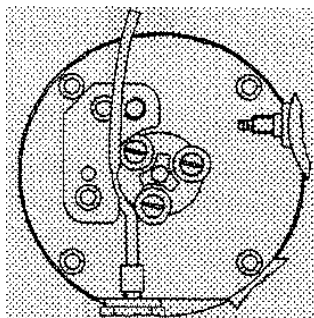
Fitting the new pump hose

NOTE:

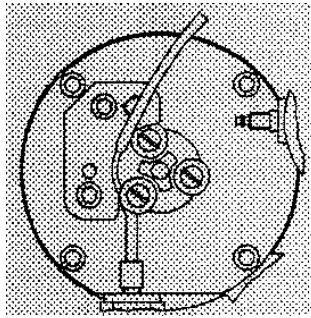
Make sure that the new pump hose is not twisted when it is fitted.

Check that the sample bottles are being filled properly after changing the hose.

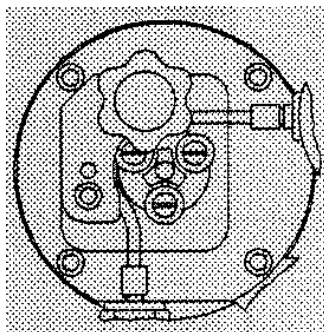
- Fit new pump hose on injection needle and tighten union nut.
- Put the conveying wheel in the position shown in the diagram and fit pump hose in the groove opposite.



- Continue turning the conveying wheel clockwise and fitting the pump hose until the pump hose is fully fitted in the groove.

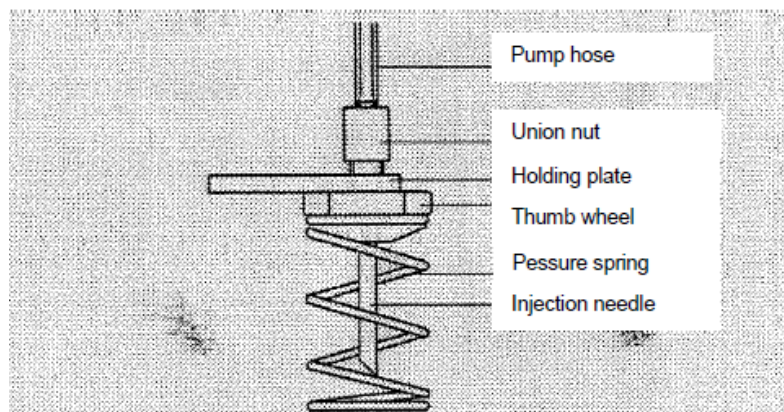


- Place union nut on pump hose.
- Fit pump hose on intake cannula and tighten union nut.
- Fit rotor protection and screw down star handle.



Injection needle mounting

16.8.3



Disassembling the injection needle

The injection needle and thumb wheel (with thread for union nut) form one unit.

- Unscrew union nut and remove pump hose
- Remove pressure spring
- Unscrew injection needle from holding plate (turn thumb wheel)

To assemble, follow the steps in reverse order.

17 Start of operation

17.1 Process and instructions

The MAK LYNX 3003 operating instructions and the configuration instructions are constituent parts of this manual. Strict adherence to all these instructions is required.

The basic procedure for starting up the system is as follows:

1. Check that the entire system is wired correctly before switching on the wiring system voltage.
2. Set all the parameters on the Controller. The menu structure of the configuration instructions can be followed. It is not absolutely necessary to follow the order but all the menu items should be completed. The configuration instructions cover the individual menus, including their meaning and possible settings, and they also cover the assignment and meaning of the inputs, outputs and vehicle-specific settings.



Note:

After start of operation, it is advisable to print out the parameter settings (to file with your vehicle documents).

17.2 Attribution of PNET address system 3003 and 3002

**Caution:**

Machines which have been operated in the 3003 system (e.g. printers) cannot be used in the 3002 system until the address has been repro-grammed. This can currently only be done at BARTEC BENKE.

MID 6823-X

System 3002: PNET address 22 H

System 3003: PNET address 22 H

Register E8 = 342022

I/O box 6753-110

Supplier sampler 3002: PNET address 35 H

Supplier sampler 3003: PNET address 35 H

Bar code reading station 6723-10

System 3002: PNET address 46 H

System 3003: PNET address 46 H

ULTRASAMPLER controller 6771-31

System 3002: PNET address 4B H

System 3003: PNET address 4B H

Dual sampler controller 6970-30

Unit 1 system 3003: PNET address 4C H

Unit 2 system 3003: PNET address 4D H

Flow level meter 6826-X (connect to PNET for configuration only)

System 3003: PNET address 60 H

PNET addresses are written in HEX format (\$).

17.3 Setting/adjustment instructions for ULTRASAMPLER system with flow level meter

Correct installation

In order to guarantee that the Ultrasampler will work properly, all the components must be correctly installed and connected.

The following points are of particular importance:

- 17.3.1
- The intake hose should not be longer than 6 m.
 - At the Screw fitting of the suction hose or at the front of the suction hose a strainer should be mounted.
 - No air must be allowed to enter through unsealed points (valves, screw fittings, etc.).
 - In front of the Flow Level Meter there must be the longest possible straight line (no bends). This flow-calming section must be at least three times as long as the nominal pipe width.
 - The intake cannula must be correctly fitted.
 - Only BARTEC pump hoses may be used.
 - The sampler must be fitted at the highest point of the piping system to prevent milk residues from remaining in the system and affecting subsequent samples.
 - The injection needle must be positioned vertically over the middle of the bottle (stopper).

17.3.2 Initial operation

The following instructions and conditions must be heeded when putting the system into operation for the first time.

Maximum throughput is subject to intake quantity

The ULTRASAMPLER specifications and technical data stipulate the maximum throughput subject to the intake quantity.

The ULTRASAMPLER has a peristaltic pump therefore its maximum delivery volume is limited by physical and mechanical variables (e.g. the viscosity of the hose or the maximum acceleration of the stepper motor). The stepper motor needs 400 steps for one revolution where the maximum frequency is 10 kHz.

The maximum rotational speed is therefore as follows: $\frac{10 \text{ kHz}}{400 \text{ Hz}} = \frac{25 \text{ revolutions}}{\text{s}}$

At normal pressure (approx. 0.3 bar), the pump delivers about 0.27 ml per revolution (which corresponds to the hose calibration factor = 270).

The pump delivery at the maximum frequency of 10 kHz is as follows: $25 \cdot 0.27 \text{ ml} = 6.75 \text{ ml per second}$.

The starting and braking time of the stepper motor is approx. 0.5 seconds.

Time required (pump threshold limit) to fill one sample bottle with 35 ml to 100 %:

$$35 / 6.75 + 0.5 \text{ sec} = 5.7 \text{ sec.}$$

In order to obtain a representative sample, therefore, the intake process must not be shorter than 5.7 seconds.

If the pre-rinse function is activated, the pre-rinse time of approx. 0.5 seconds must be added to this time.

Basis for calculation:

Pressure: Approx. 0.3 bar

Calibration factor (hose): Approx. 270

Sample bottle volume: 35 ml

Flow-calming section: $\geq 3 \times \text{NW}$ (NW50 = 150 mm, NW76 = 228 mm)

Taking these figures as a reference, the following table can be used as an approximate guide at minimum intake quantity:

Intake quantity	Max. throughput Without pre-rinse	Max. throughput With pre-rinse
20 l	200 l/min	180 l/min
40 l	400 l/min	380 l/min
80 l	800 l/min	760 l/min
160 l	1600 l/min	1520 l/min



NOTES

It is relatively difficult to operate the intake pump at different levels therefore it is possible to use the low output for 20 l and 40 l, for example, and the high output for the other quantities.

In any case there must be provision for at least a single-stage reduction of throughput.

If the restrictor is activated for a certain time, this time must be selected so that the entire intake process is completed with this restricted output, i.e. a time setting of at least 6 seconds is required at a throughput of 200 l/min.

The system is actuated automatically via an output on the MAK 3003 data logging system at pre-sample setting and intake quantity < 80 l.

The suction capacity with small intake quantities is continually increased and is greatest at the end therefore the throughput of the system should not be taken to the performance limit of the sampler as it is then no longer possible to adjust power peaks and therefore the required representativeness cannot be achieved.

Preparations for the operational check

Prepare 220 l of saltwater for intake.

Concentration: approx. 500 g of salt (1 pack) to 200 l of water.

The saline solution should generate an output voltage of 0.3 ... 0.4 V on the fill level sensor output when the pipe is full.

It is advisable to put this amount of saltwater through the collection vehicle twice.

While the first 80 l partly get stuck in the milk pipes and in the air separator, the other 360 liters can be removed (drained) from the collecting tank vehicle for further tests.

Prepare the collection vehicle for the intake, immersing the intake socket in the saltwater.

Adjustment and settings on the ULTRASAMPLER system

Once the installation process has been duly completed and all the checks have been made to ascertain that the maximum ratings of the sampler are not being exceeded, the electrical settings can be configured.

Standard settings on the MAK 3003 controller in conjunction with ULTRASAMPLER controller type 6771-31:

Basic settings

Control mode	Current loop
Flow rate at 20 mA:	960 l/min
Set pre-sample quantity:	80 l
Pump stop:	85 %
Correction factors:	
Low volume range:	0 % (1/X)
.. operative up to:	150 l
Mid volume range:	0 % (1/X)
.. operative up to:	250 l
High volume range:	0 % (1/X)
Start delay with high volume:	2.0 s
Standard rinse:	Yes
Firmware version:	2.34

Sampler 1

Sample mode:	Single sample
Sample bottle volume:	35 ml
Overflow tolerance:	120 %
Start delay:	0.0 s
Calibration factor:	270 µL
Pre-rinse from set point:	19 l
Rinse steps:	650
Minimum number of steps:	10
Minimum stepping frequency:	50

Sampler pre-rinse check

Lift the sample bottle lifting gear to filling position.

At 160 l, for example, the intake quantity is above the quantity of 19 l specified in the parameters from which a sampler pre-rinse is required.

The sampler begins the pre-rinse on the ULTRASAMPLER without flow level meter after return signal from the MAK 3003.

A milk sensor operated by the MAK 3003 signals the start of the saltwater flow.

On the ULTRASAMPLER with flow level meter, the flow level meter signals the start of the saltwater flow.

The sampler rinse cycle is apparent from a few revolutions of the peristaltic pump, first in sampling direction then in the other direction, shortly after start of intake.

Adjusting the sample bottle fill volume

Step 1:

Take in a relatively large quantity (> 80 l, suggested > 200 l) without restricting the pump intake. This quantity must accord with the default setting.

Step 2:

Check whether the pumped sample bottle volume on the display (MAK 3003 Controller) concurs exactly with the setting to within 2 - 3 ml (this has nothing to do with the hose calibration factor at this stage!).

Adjusting the scaling

The standard setting for a flow level meter is as follows:

NW 50 mm = 28.0 m³ / h.
This corresponds to a current output of 4 - 20 mA at 0 - 480 l / min.

NW 65 mm = 57.6 m³ / h. (4 - 20 mA at 0 - 960 l / min.)

Practice has shown, however, that the flow section of the flow level meter (which is not always filled with liquid like the normal MID) varies somewhat depending on the suction system (vacuum/impeller, etc.). The flow is often 5 - 10 % higher because the incoming milk is already aerated (with air bubbles) depending on the intake position. The parameter "Flow rate at 20 mA" must be included in the basic settings to compensate for this.

at NW 50: set between 440 l/min and 520 l/min.

at NW 65: set between 900 l/min and 1020 l/min.

After changing the setting, repeat Step 1 and Step 2 until the volume levels are roughly the same.

**NOTES:**

These settings may only be adjusted by trained specialist staff.

It is important to make sure that the measuring range from 480 l/min (at NW 50) is sufficient, i.e. there is still reserve capacity to adjust upwards.

A change of the scaling from 480 l/min to 960 l/min can be helpful in this regard. This is achieved by setting the nominal width from 50 to 65 mm in the MAK controller although in actual fact the pipe is NW 50. At the same time, the E5 tab in the FLM must be set to a value between 57.6 and max. 60.0. This can only be changed by a BARTEC BENKE service engineer.

Step 3:**Fine adjustment of bottle volume:**

If the above adjustment has been carried out and the values tally then the filled sample bottle volume can be aligned with the hose calibration factor.

An increase in the factor means that less will be put into the bottles because the sampler controller assumes that the peristaltic pump will deliver more in one revolution and that therefore fewer revolutions or steps are needed to obtain the same volume.

If this value is also adjusted, the pumped volume of the sampler should be about right, even with small quantities. If this is not the case, however, it is necessary to check whether the maximum limits of the sampler are being exceeded, especially with small quantities.

Accuracy of measurement

The pumped sample bottle volume is displayed on the MAK 3003, indicating whether the sample which has been taken is representative or whether the limits of the sampler have been reached (cf. 2.1). This value should normally be equal to the sample bottle volume setting if the actual set quantity tallies with the input quantity and if the ULTRASAMPLER system has been set properly and is working correctly.

The intake process is not constant, however, but is subject to continual changes in output and air content, therefore it is only possible to obtain an approximate measurement. Another factor to bear in mind is that the change in throughput is accompanied by a change in pressure and therefore the hose calibration factor varies slightly.

The (pumped) sample bottle volume which is displayed should therefore be regarded as a rough indication only. On account of the fact that the intake process is not always constant (see above), the value can vary by about 10 % (approx. 2 - 3 ml) from the set sample bottle volume without affecting the representativeness.

Guaranteeing the representativeness of the samples

All of the above points must be observed in order to guarantee that the samples are representative. It may be the case, however, that the fat level in the automatic sample does not tally straight away with the fat value of the manual sample.

One reason for this may be that the flow and the level cannot be measured correctly because the milk is swirling vigorously at the place where the flow level meter sits (e.g. if a bend has been installed recently).

Possible remedies in this case:

- either a mechanical change in the pipeline (ideal solution!)
or
- correction factors settings of low, medium and high

The controller then takes less account of the overrun of the milk. As a result, it is assumed at the end of the intake process (i.e. when a lot of air is present) that the overrun is greater, i.e. less milk is flowing past and less is being channelled off. The milk drawn in at the end of the intake process is mainly the milk with the fat content therefore the sample which is taken will automatically be lower in fat. This method is usually only effective with small quantities (up to approx. 100 l) because with large quantities the remainder is not so heavily assessed as a percentage.

With higher throughputs (500 - 1000 l/min) this setting can also bring about an improvement with larger intake quantities because the milk can be swirling very vigorously at the end due to the high throughput.

What action must be taken if fat values are above or below average?

The following action should be taken if the fat values are found to be below or above average at the inspection and acceptance process for the ULTRASAMPLER:

Check basic settings and parameters:

- a) Remove intake cannula and check whether it is leaking or blocked
- b) Check that the intake cannula is fitted and installed properly (against the direction of flow, correct distance from pipe wall, needle bent?)
- c) Replace sampler hose
- d) Check whether the bottled sample volume tallies with the sample volume displayed on the controller

If the values vary by more than 10 %, the parameter "Flow at 20 mA" will need to be adjusted.

This setting is incorrect in many cases and is a frequent cause of complaints!

Are the limits of the sampler being observed (restrictor for small quantities, throughput?)

Is the flow level scaling adequate (480 l/m at NW 50 mm)?

Start delay setting in case of below-average fat values:

The start of the sampler can be changed with this parameter. The milk at the start of the intake is low in fat therefore, by delaying the start of the sampler, less low-fat milk is taken into the bottle, leading to a general increase in the fat content in the sample.

Start delay parameter in MAK 3003.

Configuration - Periphery - ULTRASAMPLER:

Start delay: 0.4 s

(Start with a value between 0.4 and 0.7, run a test with one quantity of milk, take the fat reading, adjust the setting if necessary and run the test again!)

In case of above-average fat values:

Option 1 (only in exceptional cases and with milk collection vehicles with high throughputs):

Above-average fat levels were measured in the higher quantities (80 l and 160 l) in the case of milk collection vehicles with high throughputs in conjunction with the ULTRASAMPLER system therefore, although there was a slightly lower than average fat level in the small quantity (40 l), the following changes were introduced (from software version 2.32 of the ULTRASAMPLER controller).

3 new parameters were introduced (1 per intake quantity), allowing the level curve to be set between proportional (more fat) and 1/X (less fat) on the ULTRASAMPLER controller.

The 3 parameters in sample collection/basic settings are defined as follows:

Low correction factor:

Effective for intake quantities which are below and equal to the low/medium switching threshold.

Medium correction factor:

Effective for intake quantities which are between the low/medium and medium/high switching thresholds.

High correction factor:

Effective for intake quantities which are above and equal to the medium/high switching threshold.

Correction factor settings: Setting range = 0 to 100

0 = curve is still proportional, i.e. as before, the level in the pipe is linear to the FLM signal (see graph)

100 = curve is now $1/X$, i.e. the level in the pipe is not linear ($1/X$ function) to the FLM signal (see graph)

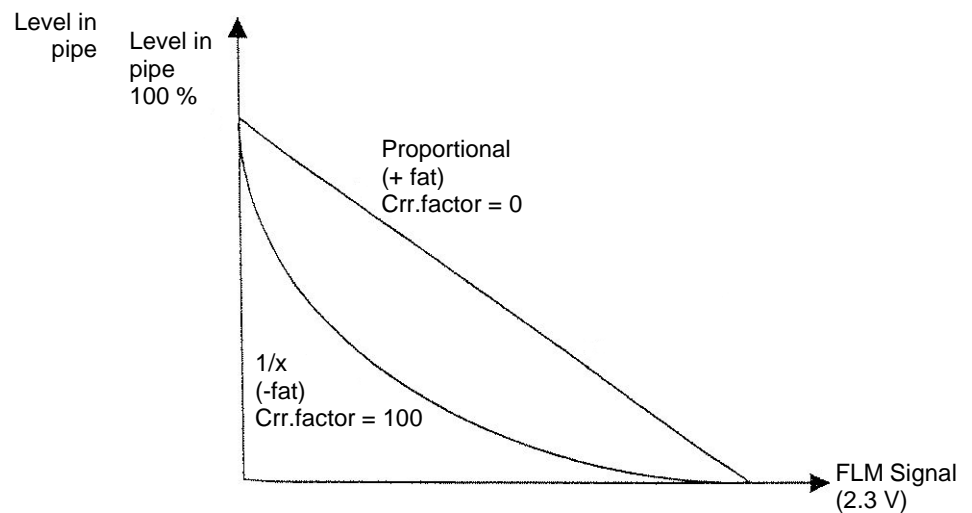


GUIDE to calculating the correct settings:

All the correction factor settings need to be calculated with milk.

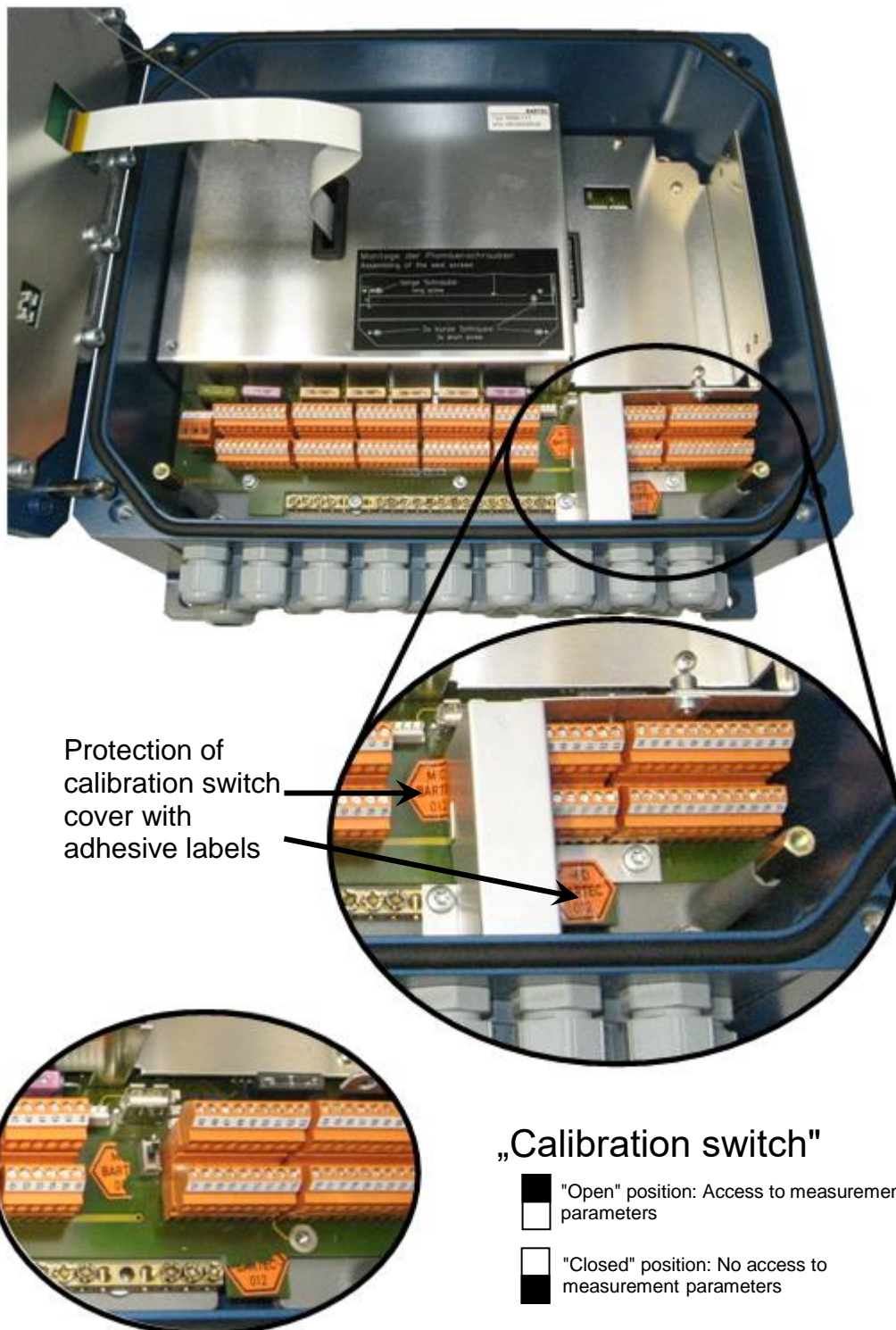
It is advisable to start with 20 (for low and medium) with the small intake quantities. After analyzing the fat levels, a higher or lower setting can then be selected based on the tendency, i.e. the correct settings need to be calculated in tests on the actual vehicle in any given case.

Graph illustrating the correction factors:

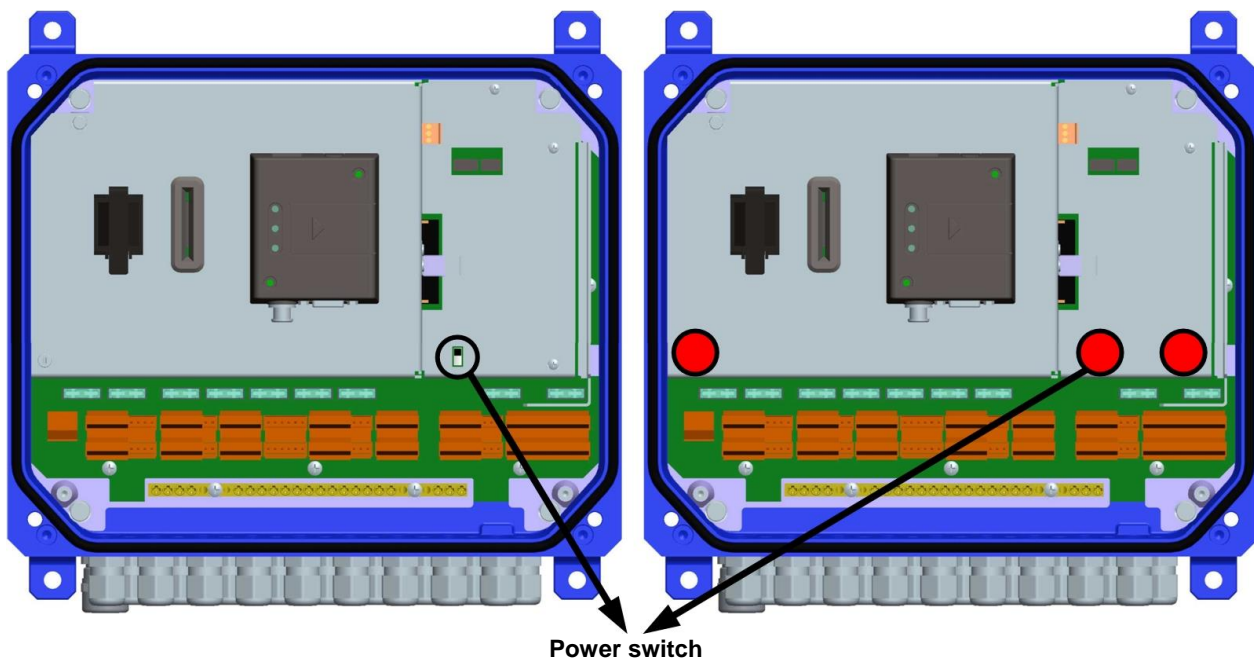





18 MAK LYNX 3003 Measuring System seal diagram

18.1 Seal diagram for Compact Controller, type 6942-10 until series B



18.2 Seal diagram for Compact Controller, type 6942-10 from series C



Fuse points compact controller		
On switch (calibration switch)		
Open Access to measurement parameters 	Closed No access to measurement parameters 	Sealed with adhesive labels - calibration switch - cover 

18.3 Seal diagram for MID, type 6823-x