GRATTE BROTHERS

TECHNICAL SUBMITTAL SHEET

Project Name:	Digital Realty – LHR19			
Project No:	GB7102	Rev:	00	
Tech Sub Ref:	GB7102-GBL-M-TS-ZZ-0015			
Issued to:	Deems Consulting and DRT		Issue date:	29/05/2019
			Approval date:	12/06/2019
Description of equipment:	• Pressurisation Units moulded on a Skid			
Locations where equipment is to be used:	Basement DWC Plant Room			
Manufacturer / Supplier:	Reflex UK			
Specification clause references and deviations:	• LHR19 Building Services Specification - B01 Mechanical Services Project Particulars • LHR19 Building Services Specification - T61 Primary, Secondary Cooling DistributionLHR19 Building Services Specification - Z14Schedule of pressurisation units			
Drawing details:	• DE-SC-DRG-M-104_T01 • DE-BA-DRG-M-400_T01			
Enclosures / samples attached:	N/A			
Additional information:	Skid shown is indicative and will be made to suit site conditions			

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Project Name:	Digital Realty – LHR19		
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APPROVALS

Company	Date	Status (A-B-C)	Comments

MAIN CONTRACTOR:	Gratte Brothers
STATUS A-B-C	COMMENTS

Signature: ……..	Date: …….

*** The equipment described within this Technical Submittal is ROHS compliant**

Reflex Winkelmann GmbH
Gersteinstraße 19 • 59227 Ahlen

Gratte Brothers
Daniel Williams
2 Regents Wharf

uk - N1 9RL London

Fax-Nr.:

Tel.-Nr.:

Your reference	Your letter	contact / technical support	telephone +44 161	fax +44 161	date
DC Digital Realty	10/23/2018	Charlie Greaves charlie.greaves@reflexuk.co.uk	226 1330		21/05/2019
		Mitch Dodman mitch.dodman@reflexuk.co.uk	77 13 51 56 81		

offer no.: 160070-6

(Please quote when ordering or in case of queries)

Project: DC Digital Realty LHR19
Enquiry no.:

Dear Mr. Williams,

Thank you for your enquiry and please find attached our non-binding offer in accordance with specifications provided. Our offer is in accordance with our General Terms and Conditions.

Our offer is in accordance with German technical regulations and EU-guidelines. Country specific regulations can be implemented by arrangement at an additional cost.

The following prices are per unit and excluding VAT.

discount : **The delivery and invoice will only be provided by the wholesaler.**
delivery period : For delivery information please ask your wholesaler.
freight : ex works

price-validity : 1/21/2019

If you have any further questions for Reflex and Sinus products, please do not hesitate to contact us.

technical support : Office Reflex UK + Ireland
Country Manager: Tim Williams,
tel. +44 7702493168
tim.williams@reflexuk.co.uk

Kind regards

offer no.: **160070-6**

of **21/05/2019**

position	article	position by detailed estimate/product	quantity	unit price	disc. %	total price
1	**Info**	**system parameters**				
	(Reflex article)	WG: 0 Special article	1			
		Reflex information System Volume (Ltrs): 70,000 Flow/Ret Temp(Deg.C): 28 (max) Ambient temp (deg C) 35 Static head (mtr) :28 Htg/Chiller Load KW : 5000				
2	**8911200**	**Hydraulic unit**				
	(Reflex article)	WG: 38 Variomat- Giga control units VS,GS,GH	2			
		Reflex Variomat Control unit VS 2-2/60, for Press., deaeration and water make-up Control Touch: Touch Screen Operation User Friendly operation 1 x Volt free output: Common Fault 1 x Volt free output: Low level in vessel 2 x RS 485 outputs 1 x Analogue Output for Level / Press (**should be used for multiple process signals back to BMS for press/level**) Storage of error and parameter information 1 x slot HMS Module (not active yet) 1 x slot for KNX Module (not active yet) 1 x slot for Bluetooth (not active yet) Integral Instruction Manual / wiring diagragm / help menu (trouble shooting) Variable common fault alarm settings to client site requirements Master/Slave operation possible. Contact Meter info. Connection possible				
3	**8600611**	**expansion vessel**				
	(Reflex article)	WG: 36 Variomat VG/VF	2			
		Reflex Variomat Basic vessel VG1000/740, for Variomat pressurization unit, grey				
4	**6940300**	**expansion vessel connection kit**				
	(Reflex article)	WG: 39 Variomat- Giga options	2			
		Reflex Variomat connection set G 1, for VG Basic vessels, 480-740 mm dia.				
5	**7857700**	**rupture detection probe and relay kit**				
	(Reflex article)	WG: 86 accessoires/optional equipment	4			
		Reflex diaphragm rupture detector MBM, for prefitted tank.				
6	**8519000**	**buffer vessel**				
	(Reflex article)	WG: 21 Reflex G 80 - 1000	2			
		Reflex G 100, grey, standing expansion vessel, 6/3,5 bar Reflex G, bladder expansion vessel for sealed heating and cooling systems,				

Reflex Winkelmann GmbH • Gersteinstr. 19 • 59227 Ahlen, Germany • Postfach 2261 • 59210 Ahlen, Germany • Tel.: + 49 2382 7069-0 • Fax: + 49 2382 7069-9588 • www.reflex.de
Geschäftsführer: Norbert Hülsmann, Volker Mauel • USt.-Ident-Nr.: DE 178 726 058 • Steuer-Nr.: 304/5987/2077 • Handelsregister: Amtsgericht Münster • HRB 13297, Sitz: Ahlen
Bankverbindung: Deutsche Bank Ahlen • IBAN: DE64 4107 0049 0120 8750 00 • BIC/SWIFT-Code: DEUTDEDE410
Sparkasse Münsterland Ost • IBAN: DE35 4005 0150 0000 0332 82 • BIC/SW IFT-Code: WELADED1MST

position	article	position by detailed estimate/product	quantity	unit price	disc. %	total price
		built according to EN 13831. Approval according to EC Pressure Equipment Directive 97/23/EC. - construction on profile or tubular feet - durable external epoxy powder coated finish - replaceable bladder - pressure gauge in the nitrogen compartment				
7	**9119204**	**buffer vessel connection kit**				
	(Reflex article)	WG: 80 AG/MK shut-off devices	2			
		Reflex AG Connection set, 1, incl. protected shut-off and discharge				
8	**8829100**	**De-gasser**				
	(Reflex article)	WG: 71 Servitec	2			
		Reflex Servitec 60, self-optimizing vacuum spray deaeration/make-up unit				
		Control Touch: Touch Screen Operation User Friendly operation 1 x Volt free output: Common Fault 1 x Volt free output: Low level in vessel 2 x RS 485 outputs 1 x Analogue Output for Level / Press (**should be used for multiple process signals back to BMS for press/level**) Storage of error and parameter information 1 x slot HMS Module (not active yet) 1 x slot for KNX Module (not active yet) 1 x slot for Bluetooth (not active yet) Integral Instruction Manual / wiring diagragm / help menu (trouble shooting) Variable common fault alarm settings to client site requirements Master/Slave operation possible. Contact Meter info. Connection possible				
9	**8997705**	**I/O extension modules**				
	(Reflex article)	WG: 39 Variomat- Giga options	4			
		Reflex I/O Module VS, Extension module for Reflex Variomat pressurization unit				
		Extension Module: Requires separate power supply 230V 50Hz 1 Ph Suitable for wall mounting 6 x Digital Inputs 6 x Volt free outputs to suit BMS				
10	**8860300**	**Modbus modules**				
	(Reflex article)	WG: 86 accessoires/optional equipment	2			
		Reflex Bus Module Ethernet, Extention Reflex Control Basic/Touch				
11	**6811205**	**Water make-up**				
	(Reflex article)	WG: 70 Fillcontrol, Fillset	2			
		Reflex Fillset with contact water meter				

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position	article	position by detailed estimate/product	quantity	unit price	disc. %	total price
		for water make-up				
12	**Frei**	**Skid mounting**				
	(Reflex article)	WG: 0 Special article	2			
		Free gross				
		Each skid shall comprise of the following. Reflexomat compact/Reflexomat or Variomat/Variomat giga with associated vessel(s) and compressor or pumps as appropriate, all controls and/or extension modules and rupture detection relay kits.pressure step spray tube degasser with integeral water make-up (where appropriate RPZ will be supplied by others)or pressure step spray tube de-gasser with separate water make-up unit with breaktank and pump. All intra-skid connections (hydraulic and/or air and electrical) will be completed by the equipment manufacturer. All external connections hydraulic (to the system), mains water and electrical incoming mains will be made by the contractor in line with the equipment manufacturers instructions/requirments. For approximate skid dimensions please see the consulting engineers schedule.				

total price of all Reflex articles: 57,586.20 GBP

Articles without price are not Reflex Winkelmann GmbH products and therefore are not included in the total price.

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Contents

Section 1. Pressurisation unit.

1.1: Sizing Criteria

The following system criteria has been used to make the selection:

System volume	: 70,000 litres
Flow/ return temperatures	: 35/28ºC
Max ambient temperature	: 40ºC
Static head	: 28 m
Heating/Cooling load (KW)	: 5,000 KW

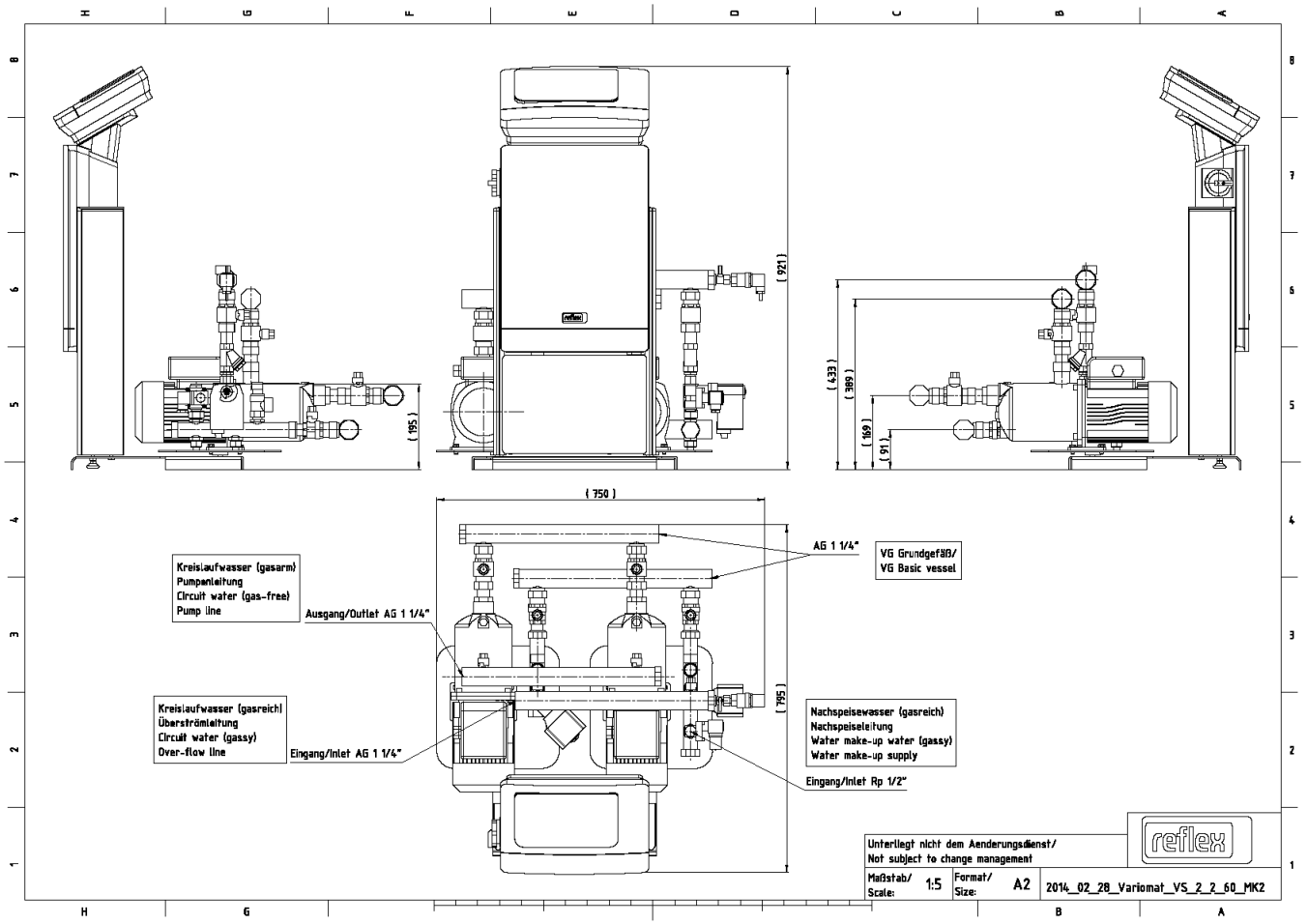
1.2: Variomat Technical Details

Pump controlled pressure maintenance system with pressure control band of +/- 0.2 bar. C/W integral water make up suitable for large heating and chilled water applications. The unit consists of 2 pumps, 2 overflow valves and control panel (see below):

Control/ Hydraulic Module – Reflex Variomat VS 2-2/60 (Article No. 8911200). I/O Module (Article No. 8858405)

- 4.3” touch screen colour display with graphic user interface.
- Integrated control of system pressure, de-aeration and water make up.
- Manual and automatic operation.
- 6 Volt free contacts for common fault and contact water meter input (I/O Mod)
- RS-485 interface for control panel connection.

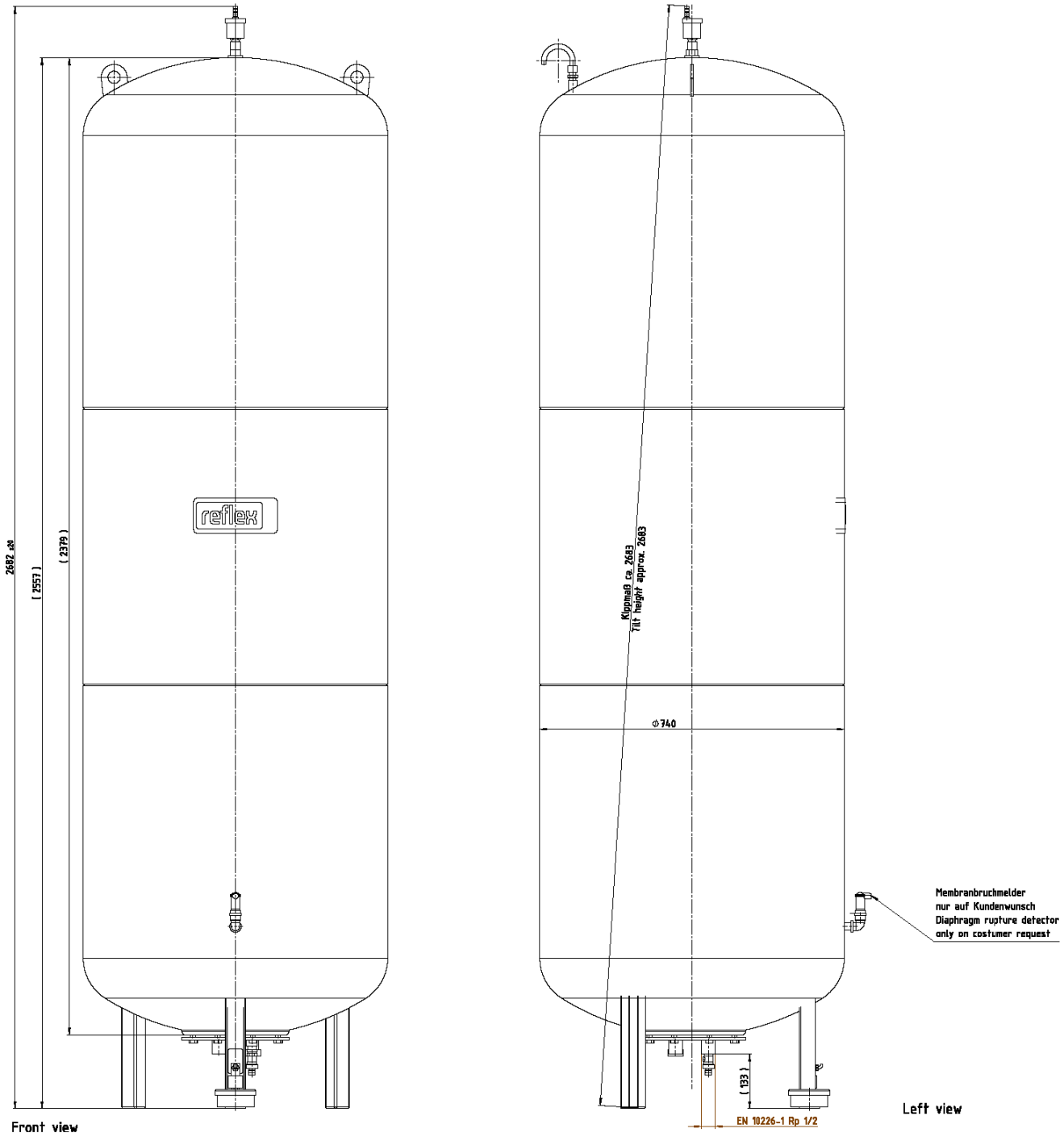
Electrical Data – 2 No. 1.1 KW rated pumps 1/50/230.
Qty: 2 No. required



1.3: **Basic Vessel technical details**

Reflex 'variomat VG basic vessel', bladder expansion vessel for reflex 'variomat pressurisation systems, unpressurized, built and tested according to EN 13831 and EU Pressure Equipment Directive 97/23/EC.
Vessel manufactured of steel with grey external, anti-corrosion paint protection.
The high quality of butyl bladder is preventing the vessel contents from permeation of oxygen. Vessel supplied with 2 x connection hoses (to suit the hydraulic module), automatic air vent (de-aeration), level transducer (tank volume) and swan neck (anti vacuum). Vessels stand vertical with steel profile or tubular feet

VG 1000 Basic Vessel Article Number – 8600611 (2 No. required)



1.4 Modbus technical details.

Modbus TCP for control Touch which allows connection of the Reflex Control Touch panel to Modbus-TCP network.

Direct Integration at the control board at the Control Touch (factory fitted) and set up during commissioning phase via flash drive.

Connection to the Bus System: D-Sub 9 The Exchange of Data can be via modbus TCP (cont'd page 8) .

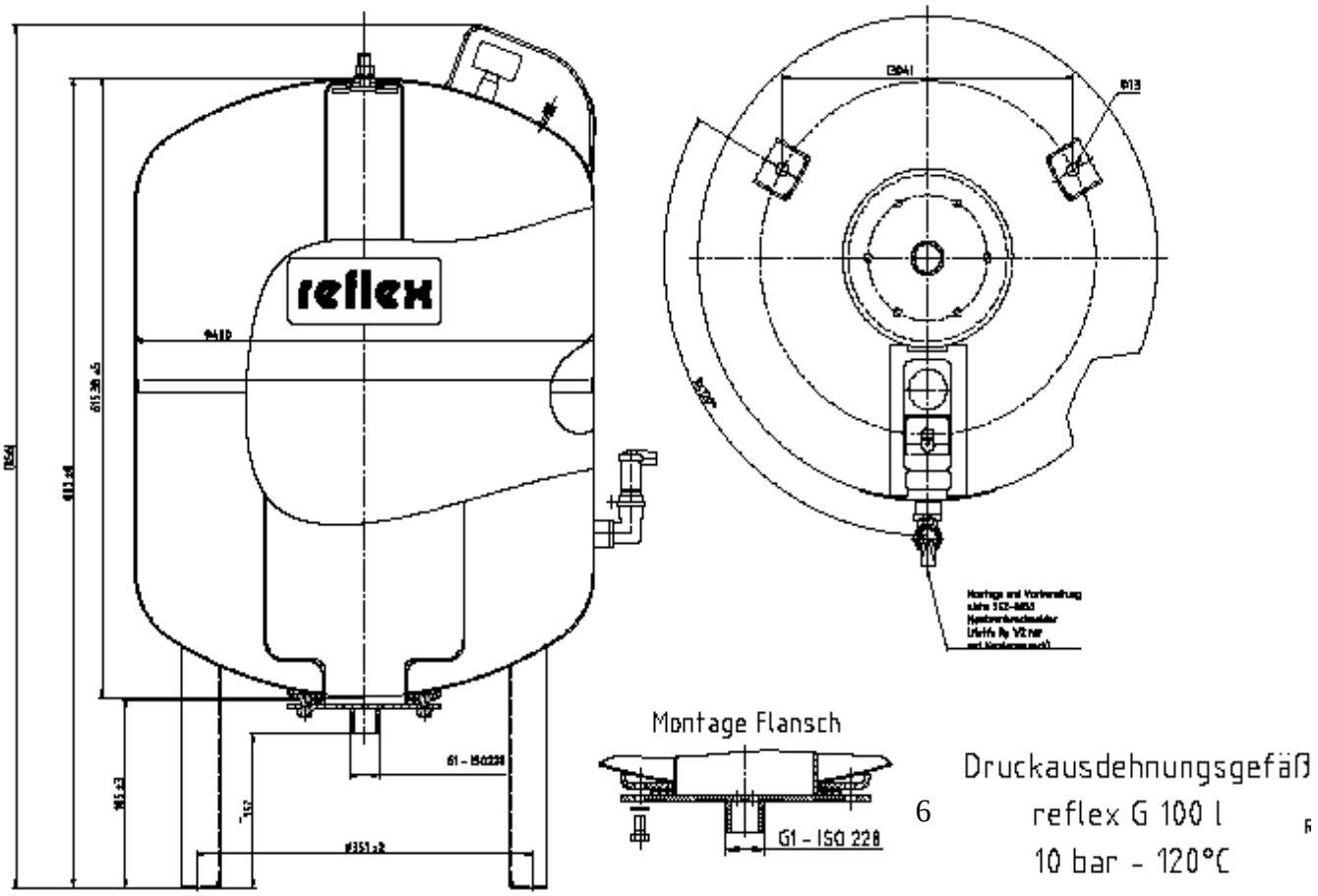
Type : Modbus TCP (ethernet)
Dimension : 340x224x77 mm
Electrical Data : 230/1/50Hz
Article No. : 8860300
Quantity : 2 No.

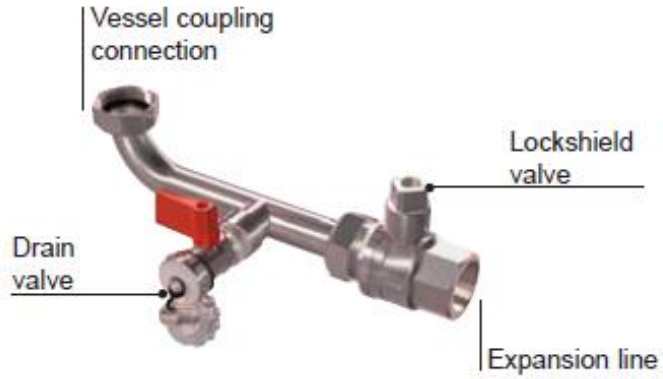
1.5: Reflex Master-Slave-Connect Software technical details

Reflex Master-slave-Connect extension option for the optimized operation of up to "10" Variomat/ giga & Reflexomat units in hydraulic interconnection at a distance of max 1000m
Master-Slave-Connect Article-No. 7859100 (Qty: 2 No.)

1.6: Buffer Vessel & Connection Set technical details.

Type G 100 vessel article no.: 8519000 (Qty: 2 No.)
Vessel connection set article no.: 9119204 (Qty: 2 No.)





1.7: Reflex diaphragm rupture detector technical details

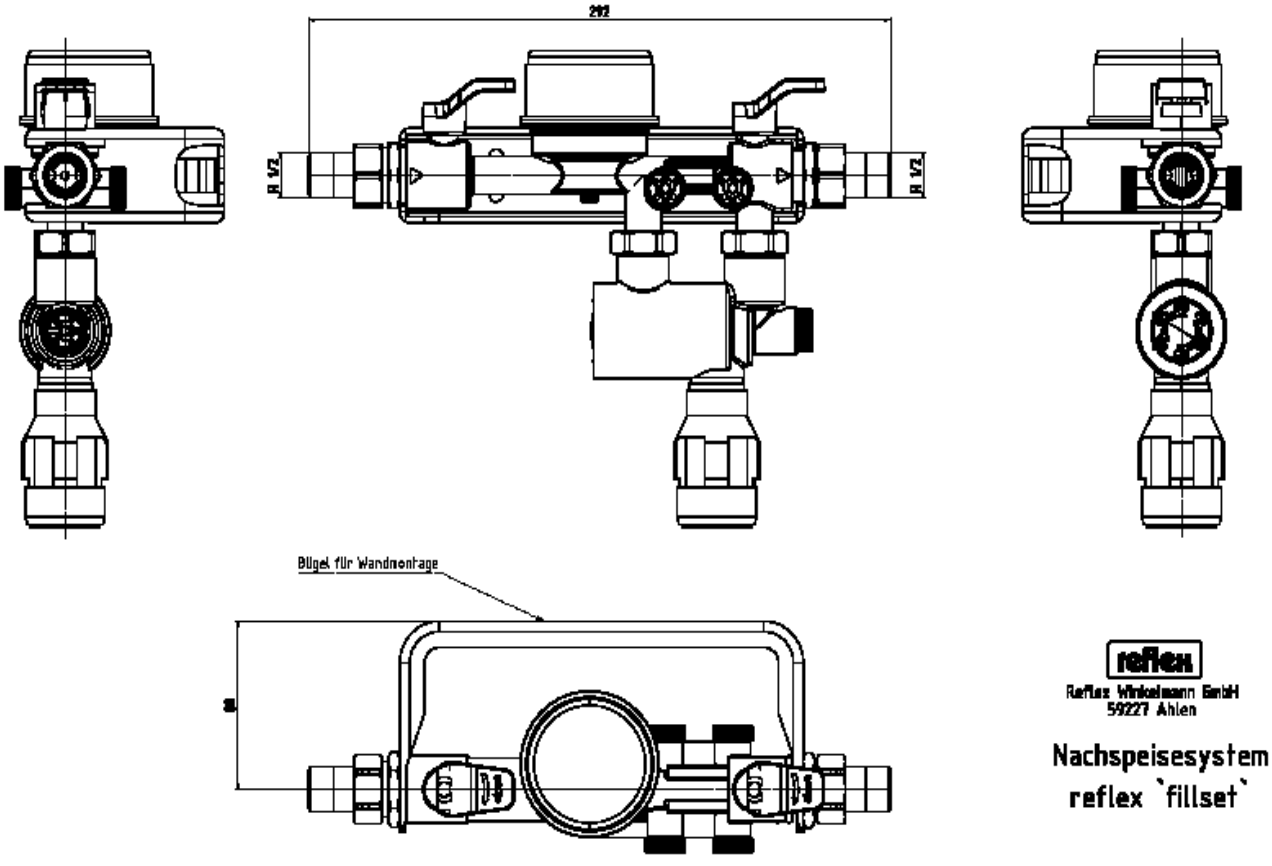
Reflex Diaphragm rupture detector for factory installation on reflex bladder type expansion vessels. Electronic signal output for leak detection if a rupture in the bladder.

Consists of an electrode (factory mounted onto vessel) and electrode relay
1/50/230 Supply
Three terminal dry contact
Relay suitable for wall mounting
Article No.: 7857700
Quantity: 4 No.

1.8: Water make up technical details

Reflex fillset with contact water meter for system water replenishment. (non WRAS approved)

Article No. 6811205 (Qty: 2 No.)



Section 2: LHR19 system vacuum degasser.

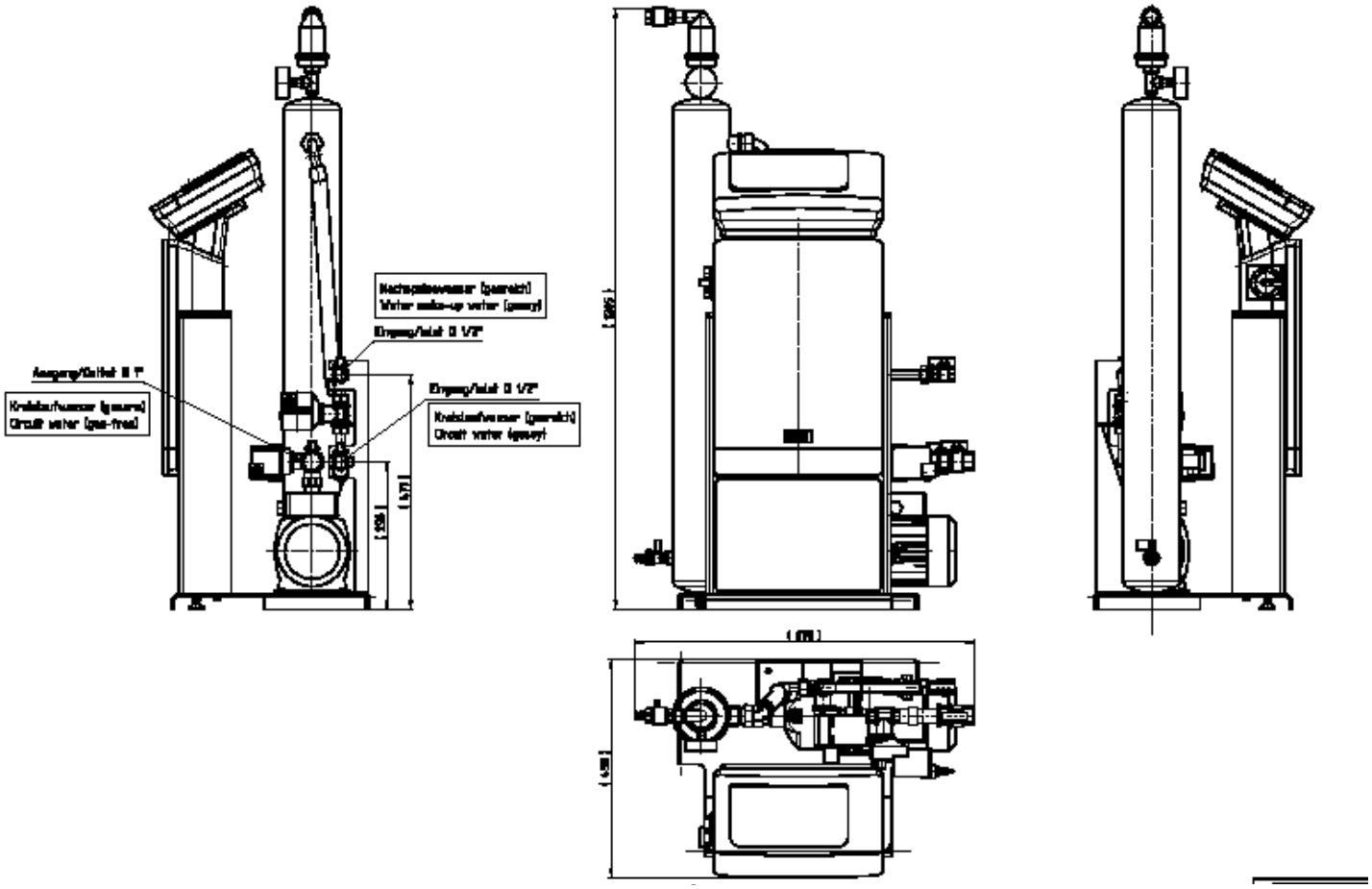
2.1: Sizing Criteria

System volume	: 70,000 litres
Flow/ return temperatures	: 35/28ºC
Max ambient temperature	: 40ºC
Static head	: 28 m
Heating/Cooling load (KW)	: 5,000 KW

2.2: Servitec Vacuum water make up and de-gasser technical details

Reflex Servitec 60 vacuum spray-tube de-aeration for closed heating water and cooling circuits, as fully automated multifunctional unit with "auto start"-function and automatic hydraulic balance for de-aeration and make-up of the system water.
Consisting of a lockable, standing control unit and a vacuum spray-tube, with CE-identification. Control unit completely piped, wired in a plug-ready manner according to VDE regulations, connection cable (l=5m) and shock-proof plug, system connections via integrated shut-offs.
Vacuum spray-tube made of stainless steel operates with an optimized height-diameter ratio and is equipped with vacuum spray nozzle, dipstick de-aeration and level monitor. The fully automated, freely programmable microprocessor control offers a real-time clock, differentiating fault and parameter store, plain text display of the system pressure and all relevant operating and fault messages. An LED-display informs about the operating modes manual-auto-stop.
A dry output for group failure message is useable as another utilizing option. Working method in self-optimizing operation mode with cycles for continuous, interval and make-up de-aeration.

Servitec 60T Article No. 8829100 (Qty: 2 No.) C/W I/O modules (article number 8997705)



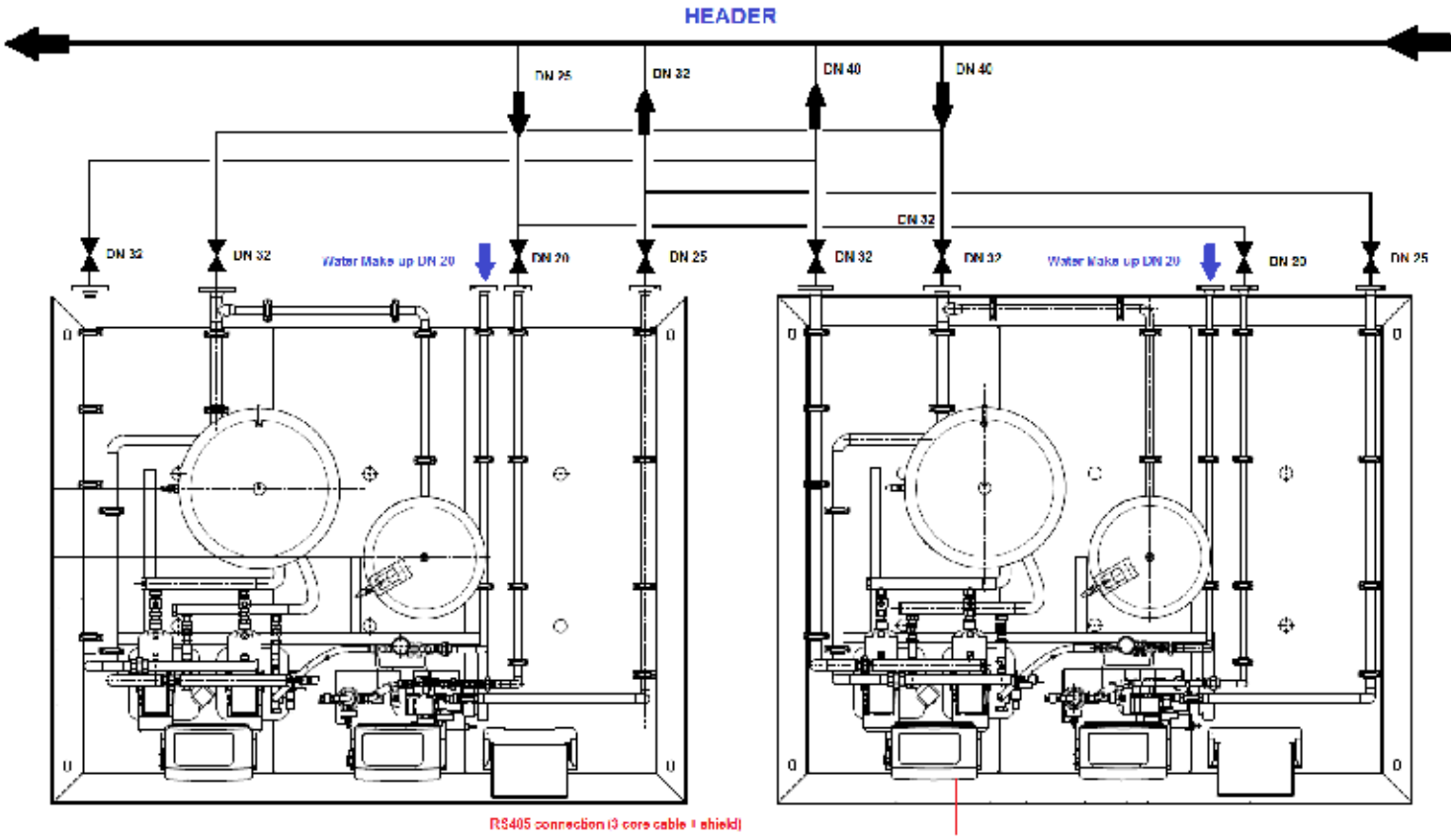
Section 3: Typical Skid assembly/layout

3.1: Scope of supply

Each skid shall comprise of the following:
1 No. Variomat control and hydraulic module, including Modbus and master/ slave modules
1 No. basic vessel
1 No. Buffer vessel and associated rupture detector
1 No. water make up (non WRAS)
1 No. Servitec vacuum de-gasser

All interconnecting hydraulic pipework and wiring is included so site need one power source and system pipework to the hydraulics. Connection from the hydraulics to the basic and secondary vessels is to be done by others.

Typical layout below. As this is a bespoke unit, accurate dimensional drawing will be issued at time of order.
Quantity: 2 No.



Section 4: Modbus Module technical details

Section 4.1 Modbus details
Data from the controller to Modbus

Modbus/TCP

6 Modbus/TCP

The bus module works as a Modbus/TCP slave. A Modbus/TCP server runs on Port 502 and provides the following functions for d retrieval:

Mode Function Code	Designation	Addressing
1	Read coils	Bit address
2	Read input discretes	Bit address
3	Read multiple registers	Word address
4	Read input registers	Word address

You can retrieve the following data:

Designation	Word address	Bit addresses
System pressure in 1/100 bar – Not for Servitec "Levelcontrol"	010h	
Filling level in % – Not for Servitec, optional Pressure filling pipe in 1/100 bar for Servitec	011h	
Digital outputs	012h	0120h Pump 2 ON 0121h Pump 1 ON 0122h Overflow valve 2 OPEN 0123h Overflow valve 1 OPEN 0124h Make-up valve OPEN 0125h Message: min. level – Not for "Control Basic" 0126h Message: Group fault 0127h Message: Make-up fault – Only for Gigamat on MK200 basis
Digital outputs	013h	0130h Feedback Pump 1 0131h Feedback Pump 2 0132h Insufficient water switch 0133h Water meter
Fault messages 1	014h	0140h Extension module defective – Optional 0141h EEPROM defective 0142h Undervoltage 0143h Below minimum pressure 0144h Insufficient water 1 0145h Pump 1 fault 0146h Compressor 1 fault 0147h Pump 2 fault – Not for "Control Basic" 0148h Compressor 2 fault – Not for "Control Basic" 0149h Pressure measurement fault 014Ah Level measurement fault 0148h Pressure measurement spray tube fault – Only with Servitec 014Ch Stop mode for more than 4 hours 014Dh Insufficient water 2 – Only with Servitec

Designation	Word address	Bit addresses	
Fault messages 2	015h	0150h	Main circuit board fault – Not for "Control Basic"
		0151h	Digital input voltage fault – Not for "Control Basic"
		0152h	Analogue input voltage fault – Not for "Control Basic"
		0153h	Input voltage ball valve 1 fault
		0154h	Input voltage ball valve 2 fault
		0155h	"Pressure" jumper fault – Not for "Control Basic"
		0156h	"Level" jumper fault – Not for "Control Basic"
		0157h	Dry run – Only for "Control Basic"
		0158h	Insufficient water 3 – Only for "Control Basic"
		0159h	Insufficient water 4 – Only for "Control Basic"
Fault messages 3	016h	Not assigned	
Warnings 1	017h	0170h	Not used
		0171h	Maximum level exceeded
		0172h	Pump runtime exceeded
		0173h	Make-up time exceeded
		0174h	Make-up cycles exceeded
		0175h	Maximum pressure exceeded
		0176h	Make-up quantity exceeded
		0077h	Filling time exceeded – Only with Servitec
		0178h	Filling quantity exceeded – Only with Servitec
		0179h	Discharge period exceeded – Only with Servitec
		017Ah	Make-up valve leaking
		017Bh	Power failure
		017Ch	Null balancing defective
		017Dh	Parameter defective
		017Eh	Maximum make-up quantity exceeded
		017Fh	Maintenance requested

Designation	Word address	Bit address	
Warnings 2	018h	0180h	Replace battery – Not for "Control Basic"
		0181h	Softening, replace cartridge
		0182h	Check data logger – Not for "Control Basic"
		0183h	––
		0184h	Stop mode for more than 4 hours – Only for "Control Basic"
Warnings 3	019h	0190h	Expansion module, message digital input 1
		0191h	Expansion module, message digital input 2
		0192h	Expansion module, message digital input 3
		0193h	Expansion module, message digital input 4
		0194h	Expansion module, message digital input 5
		0195h	Expansion module, message digital input 6
		0196h	Expansion module, message digital Output 6
Operating hours Compressor/Pump 1	01Ah (H) 01Bh (L)		
Operating hours Compressor/Pump 2	01Ch (H) 01Dh (L)		
Water meter cumulative sum in litres	01Eh (H) 01Fh (L)		
Bus module status	020h	0200h	No connection between bus module and controller
		0201h	MK200 design
Type	021h	1	Variomat
		2	Variomat Giga
		3	Reflexomat/C
		4	Servitec
		5	Fillcontrol Auto (only for "Control basic")
		6	Servitec-25 – Only for "Control Basic"
		7	Servitec-30 – Only for "Control Basic"
		8	Fillcontrol Auto Compact – Only for "Control Basic"
		9	Fillcontrol Plus – Only for "Control Basic"
Operating state	024h	0248h	"MANUAL" operating mode
		0249h	"STOP" operating mode
		024Ah	"AUTO" operating mode

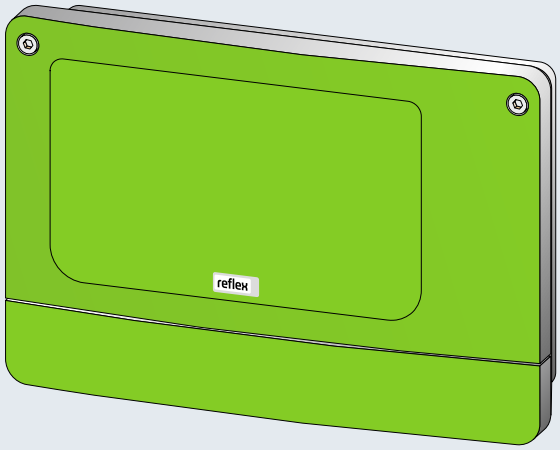
reflex
Thinking solutions.

Busmodul - Ethernet

GB

Operating manual

Original operating manual



1 Notes on the operating manual

Notice!

Every person installing this equipment or performing any other work at the equipment is required to carefully read this operating manual prior to commencing work and to comply with its instructions. The manual is to be provided to the device operator and must be stored near the device for access at any time.

2 Models

A Modbus/TCP master uses the "Ethernet" bus module to read the operating state of the Reflex controller. This state can be displayed in a web browser. An RS – 485 interface connects the controller to the bus module.

Two connection options are provided:

- Standard (R-S-I Art.No. 003544)
  - The bus module assumes the "master function" on the RS-485 interface to the controller and retrieves the data.

This variant is used only when the "network interface" (S1) is used to connect the bus module to the controller.

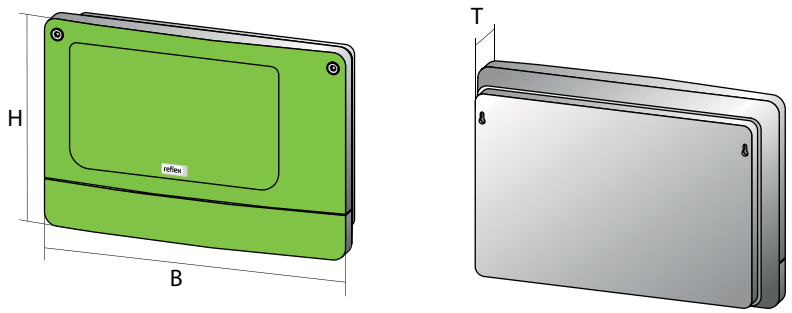
- Module bus interface version (R-S-I Art.No. 003548)
  - The controller assumes the "master function". The bus module works as an "I/O module" and is cyclically polled by the controller.

This variant is used when the bus module is connected to the "Control Touch" controller at the S2 module bus interface of Control Touch (in parallel to the main circuit board).

Note!

You use a DIP switch to select the mode, see chapter 11 "DIP switch" on page 25 .

3 Technical data



Housing	Plastic housing
Width	340 mm
Height	233.6 mm
Depth	77 mm
Weight	2.0 kg
Permissible operating temperature	-5° C – 55° C
Permissible storage temperature	-40° C – 70° C
Degree of protection IP	IP 64
Voltage supply	230 V AC, 50 – 60 Hz (IEC 38)
Fuses • primary • secondary	 0.25 A 0.8 A
Ethernet interface	• 10 Base – T or 100 Base – Tx with automatic detection • RJ 45 connection
Interface to the controller	• RS – 485 or RS – 232 • 19.2 kbit/s • Floating • Connection with plug-in screw terminals • RSI–specific protocol

4 Connection

Danger – electric shock!

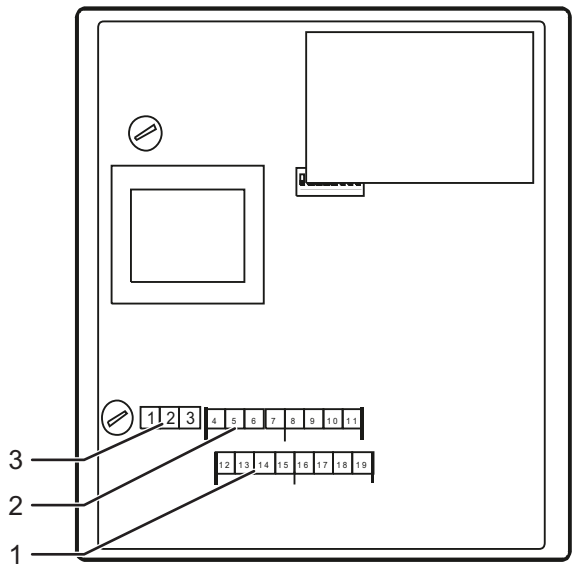
- Risk of serious injury or death due to electric shock.
  - Ensure that the system is voltage-free before installing the device.
  - Ensure that the system is secured and cannot be reactivated by other persons.
  - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

The bus module is shipped with a power cable including earthed plug as standard. If required, you may use a different power cable.

Proceed as follows:

1. Pull the power plug from the device.
2. Open the housing cover.

The connection terminals are underneath the housing cover.



000231_001_R001

No.	Component
1	COM 1 RS-232 interface
2	COM 1 RS-485 interface

No.	Component
3	Power supply 230 V

Terminal number	Signal	Function	Wiring
Power supply for the bus module			
1	L	Supply 230 V, maximal 16 A	On-site
2	N		
3	PE		
Interfaces for the bus module			
4	Signal A (+)	COM 1 RS-485 interface to the controller	User-supplied
5	Signal B (-)		
6	Signal ground		
7	Shielding (optional)		
8	--	COM 2 RS-485 interface – Currently not used	--
9	--		
10	--		
11	--		
12	"RX" signal conductor for outgoing data	COM 1 RS-232 interface	User-supplied
13	"TX" signal conductor for incoming data		
14	"GND" signal ground		
15	Shielding		
16	--	COM 2 RS-232 interface – Currently not used	--
17	--		
18	--		
19	--		

4.1 RS-485 interface

Caution – Device damage!

- Using an incorrect bus module may cause the destruction of the interface drivers.
  - Ensure the use of a correct bus module.

Proceed as follows:

- Provide the correct bus module.
- Use a shielded cable to connect the interfaces to terminals 4 to 7 of the main circuit board.
  - Use a three-wire conductor as the interface is floating.
- Install a terminator at both ends of an RS-485 network.
  - Activate the terminators.

Note!

Upon request, the Reflex Customer Service will provide the following information, see chapter 12.1 "Reflex Customer Service" on page 26 .

- RS-485 interface protocol.
- Connection details.
- Details about the optional communication modules.

4.2 Ethernet plug

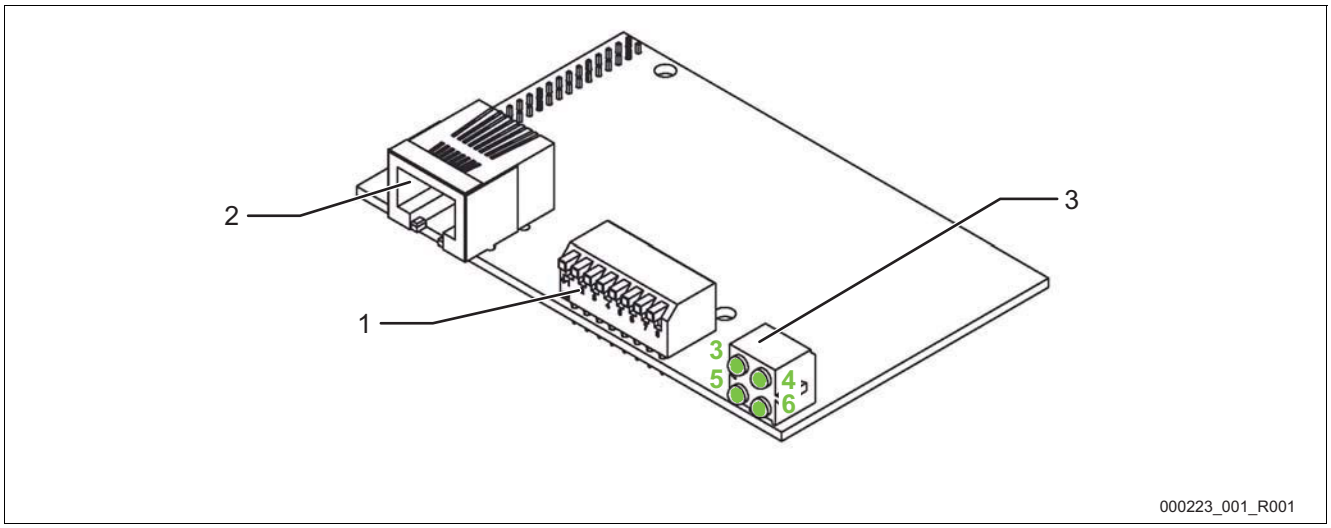
Danger – electric shock!

- Risk of serious injury or death due to electric shock.
  - Ensure that the system is voltage-free before installing the device.
  - Ensure that the system is secured and cannot be reactivated by other persons.
  - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

The Ethernet is not connected to the motherboard but directly at the Ethernet plug-in module.

Proceed as follows:

1. Open the housing cover.
2. Connect the RJ45 plug to the Ethernet connection.
   - In the case of a cable.entry with water spray protection, feed the Ethernet cable without the RJ45 plug through the screwed cable gland and then attach the RJ45 plug.



No.	Component
1	DIP switch
2	Connection for the RJ45 plug

No.	Component
3	Light emitting diodes

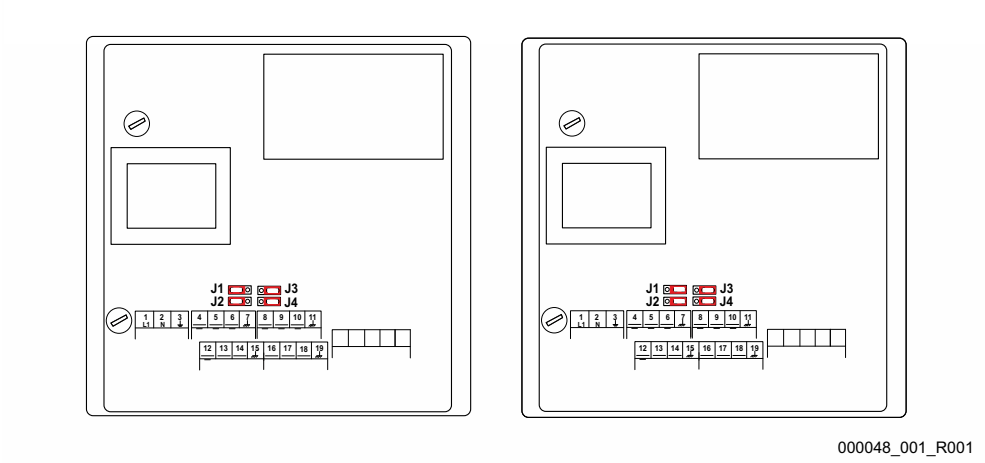
5 Settings

Danger – electric shock!

- Risk of serious injury or death due to electric shock.
  - Ensure that the system is voltage-free before installing the device.
  - Ensure that the system is secured and cannot be reactivated by other persons.
  - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

5.1 Terminators of the RS-485 interface

You must activate or deactivate the terminators at both ends of an RS-485 network.



Terminators are active Terminators are inactive

Select the setting:

- Active setting of the terminators.
  - The bus module is installed at the beginning or the end of the RS – 485 network.
  - For long conductors.
- Inactive setting of the terminators.
  - The bus module is not placed at the beginning or the end of the RS – 485 network.
  - A short conductor directly connects the.bus module with the controller.
  - Use of more than two devices.

Proceed as follows:

1. Pull the power plug from the bus module.
2. Open the housing cover.
3. Select the required setting.
   - Jumper J1 and J2 installed at the left side.
     - The terminators are active.
   - Jumper J1 and J2 installed at the right side.
     - The terminators are inactive.

The setting process for the terminators is completed.

Note!

The COM2 interface is inactive.

- The jumpers (J3-J4) are not functional.

5.2 Network settings

You must set the network in order for the Ethernet bus module to be functioning. These network settings are required:

- IP address.
  - Ask your network administrator for a free IP address.
- Subnet mask.
  - Ask your network administrator for the required settings.
- Gateway IP address.
  - Ask your network administrator for the required settings.

You have two options to set the network:

- Manual set-up.
- Automatic set-up, see chapter 5.3 "Network settings" on page 12 .
  - Use a DHCP Server.

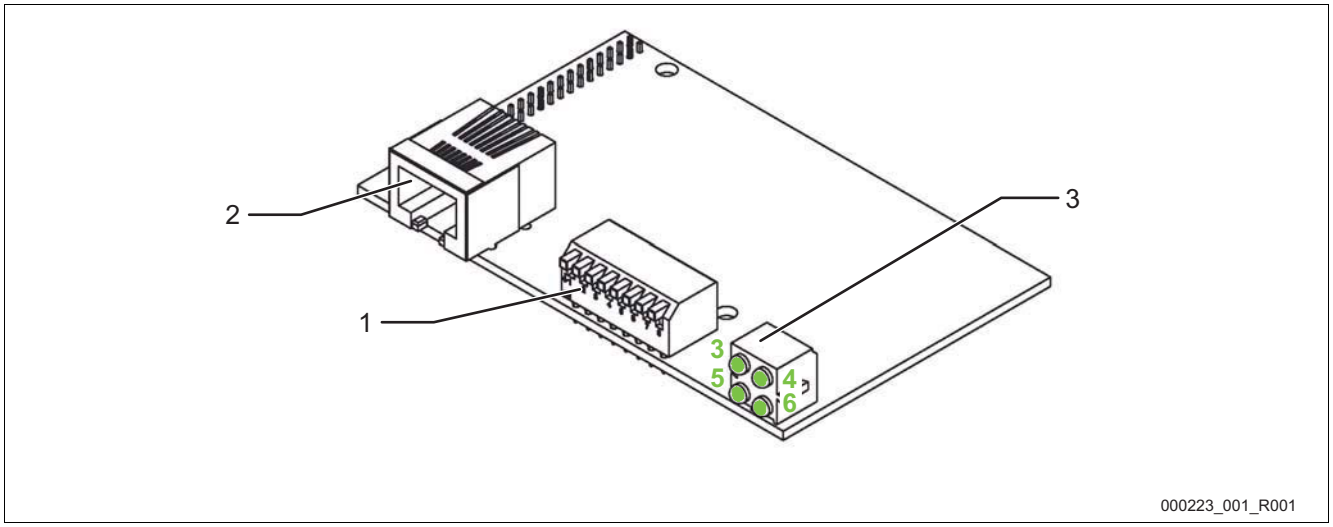
Proceed as follows to manually set up the network:

- ARP assignment of the IP address to a PC.
  - ARP assignment is only possible for IP addresses with the 192.168.0.xxx format.
  - Use the DIP switches to set the IP address.
  - Gateway is not supported.
- Set-up with an integrated web server.
  - This method is not suitable for the initial setting of the IP address, because the IP address must be set before you can open the website.
  - Setting the IP address on the website "http://<IP Address>/nwconfig.html".

Note!

For automatic set-up, you need the bus module MAC address which is located on a label on the outside of the bus module.

5.3 Network settings



No.	Component
1	DIP switch
2	Connection for the RJ45 plug

No.	Component
3	Light emitting diodes

For the automatic configuration using the DHCP server, proceed as follows:

1. Set the DIP switch to the "OFF" position.
2. Ensure that the DHCP server has been activated.

Both conditions are default settings.

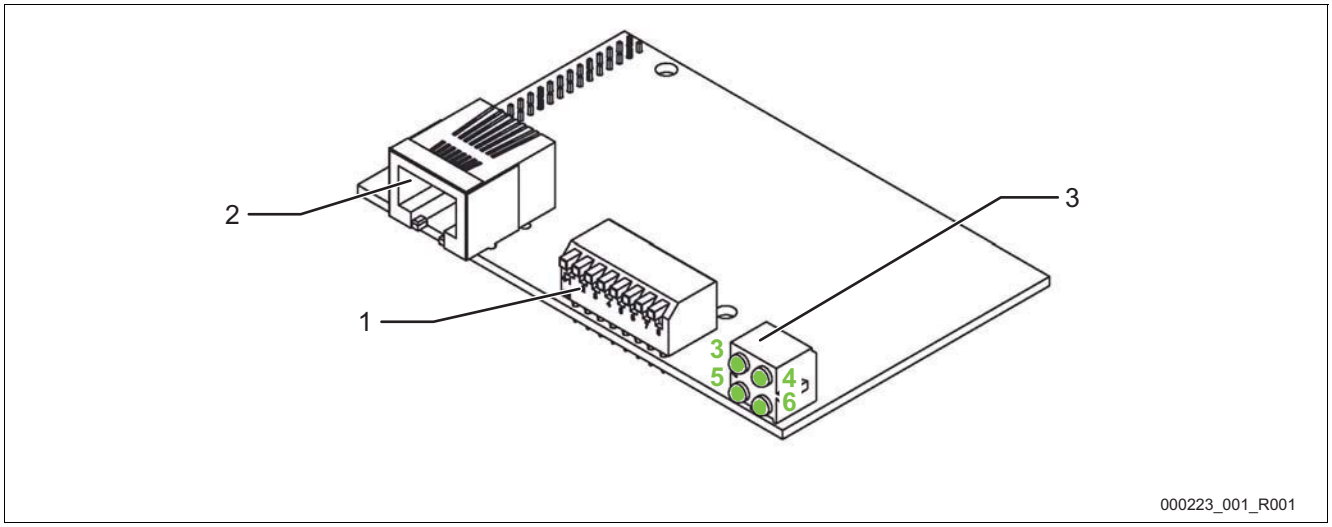
Note!

Check the conditions if other configuration methods have been previously used.

- If necessary, set the DIP switches to their original position.
- Activate the DHCP server in the web browser.

5.4 Setting the IP address with APR assignment

Use APR to set the IP address.



No.	Component
1	DIP switch
2	Connection for the RJ45 plug

No.	Component
3	Light emitting diodes

Proceed as follows to enable a setting using APR assignment:

1. Set all DIP switches on the Ethernet plug-in module to "OFF".
2. Ensure that the IP address of the PC matches the first three bytes of the IP address of the bus module.

Enter the following commands in the PC:

3. arp-s <IP Address> <MAC Address>
   - For example: arp-s<192.168.1.124.> <00-30-11-02-13-37>
4. ping <IP Address>
   - For example: ping <192.168.1.124>
5. arp-d <IP Address>
   - For example: arp-d <192.168.1.124>

The set IP address is permanently saved in the bus module. By default, the net mask is set to "255.255.255.0".
You can change the net mask and the gateway in the web browser.

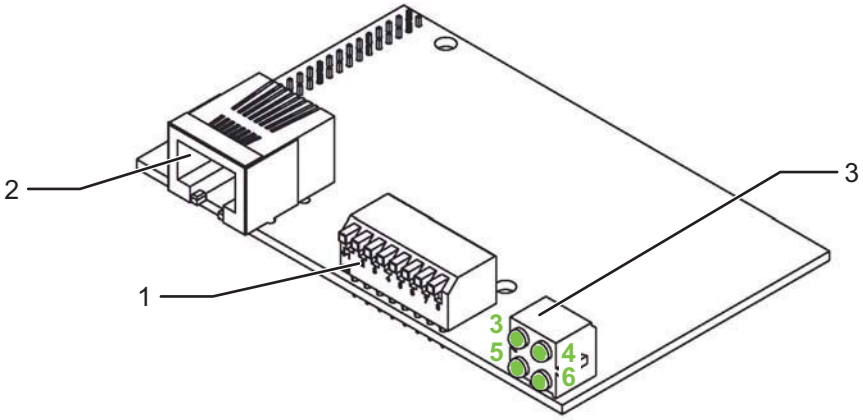
Note!

- The IP address is the desired bus module IP address.
- the MAC address is shown on a label at the bus module.

5.5 Setting the IP address with the DIP switches

If the following restrictions apply to a local network, you can set the IP address using the DIP switches at the Ethernet plug-in module":

- IP address: 192.168.0.xxx
- Subnet mask: 255.255.255.0
- No gateway



No.	Component
1	DIP switch
2	Connection for the RJ45 plug

No.	Component
3	Light emitting diodes

Set the IP address by switching the DIP switches on and off.

You set a number between 1 and 254 representing the last byte of the IP address (Host-ID).

The setting is a binary number where the "ON" position under a "1" corresponds to each binary number and the "8" DIP switch is the bit with the lowest value.

DIP switch								IP address
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	0	0	Set with ARP assignment or DHCP server
0	0	0	0	0	0	0	1	192.168.0.1
0	0	0	0	0	0	1	0	192.168.0.2
1	1	1	1	1	1	1	0	192.168.0.254
1	1	1	1	1	1	1	1	Invalid

Only the settings for IP address and subnet mask mentioned are possible when you use this method to set the IP address. The bus module cannot be reached by any other subnets because the gateway is not supported.

Note!

You cannot set the IP address with the DIP switches when all DIP switches are set to "OFF".

– In this case, you can set the IP address using ARP assignment or a DHCP server.

5.6 Network settings using a web browser

When you have set the IP address, you can use a web browser to access the integrated HTTP server of the bus module.

Proceed as follows:

1. Enter this address: https://<IP Address>/nwconfig.html.
   - Use the defined IP address of the bus module for "<IP Address>“.

The website displays a form containing the currently active network settings.

2. Confirm the following values in the website form:
   - IP address
   - Subnet mask
   - Gateway
   - DHCP active
3. Save the values in the website form.
4. Switch off and on the power supply of the bus module.
   - The new settings are applied.

The setting process is completed.

Note!

If DHCP is activated, the DHCP server is used to assign the settings for IP address, subnet mask and gateway during activation.

6 Modbus/TCP

The bus module works as a Modbus/TCP slave. A Modbus/TCP server runs on Port 502 and provides the following functions for data retrieval:

Mode Function Code	Designation	Addressing
1	Read coils	Bit address
2	Read input discretes	Bit address
3	Read multiple registers	Word address
4	Read input registers	Word address

You can retrieve the following data:

Designation	Word address	Bit addresses
System pressure in 1/100 bar – Not for Servitec "Levelcontrol"	010h	
Filling level in % – Not for Servitec, optional Pressure filling pipe in 1/100 bar for Servitec	011h	
Digital outputs	012h	0120h Pump 2 ON 0121h Pump 1 ON 0122h Overflow valve 2 OPEN 0123h Overflow valve 1 OPEN 0124h Make-up valve OPEN 0125h Message: min. level – Not for "Control Basic" 0126h Message: Group fault 0127h Message: Make-up fault – Only for Gigamat on MK200 basis
Digital outputs	013h	0130h Feedback Pump 1 0131h Feedback Pump 2 0132h Insufficient water switch 0133h Water meter
Fault messages 1	014h	0140h Extension module defective – Optional 0141h EEPROM defective 0142h Undervoltage 0143h Below minimum pressure 0144h Insufficient water 1 0145h Pump 1 fault 0146h Compressor 1 fault 0147h Pump 2 fault – Not for "Control Basic" 0148h Compressor 2 fault – Not for "Control Basic" 0149h Pressure measurement fault 014Ah Level measurement fault 014Bh Pressure measurement spray tube fault – Only with Servitec 014Ch Stop mode for more than 4 hours 014Dh Insufficient water 2 – Only with Servitec

Designation	Word address	Bit addresses
Fault messages 2	015h	0150h Main circuit board fault – Not for "Control Basic" 0151h Digital input voltage fault – Not for "Control Basic" 0152h Analogue input voltage fault – Not for "Control Basic" 0153h Input voltage ball valve 1 fault 0154h Input voltage ball valve 2 fault 0155h "Pressure" jumper fault – Not for "Control Basic" 0156h "Level" jumper fault – Not for "Control Basic" 0157h Dry run – Only for "Control Basic" 0158h Insufficient water 3 – Only for "Control Basic" 0159h Insufficient water 4 – Only for "Control Basic"
Fault messages 3	016h	Not assigned
Warnings 1	017h	0170h Not used 0171h Maximum level exceeded 0172h Pump runtime exceeded 0173h Make-up time exceeded 0174h Make-up cycles exceeded 0175h Maximum pressure exceeded 0176h Make-up quantity exceeded 0077h Filling time exceeded – Only with Servitec 0178h Filling quantity exceeded – Only with Servitec 0179h Discharge period exceeded – Only with Servitec 017Ah Make-up valve leaking 017Bh Power failure 017Ch Null balancing defective 017Dh Parameter defective 017Eh Maximum make-up quantity exceeded 017Fh Maintenance requested

Designation	Word address	Bit addresses
Warnings 2	018h	0180h Replace battery – Not for "Control Basic" 0181h Softening, replace cartridge 0182h Check data logger – Not for "Control Basic" 0183h –– 0184h Stop mode for more than 4 hours – Only for "Control Basic"
Warnings 3	019h	0190h Expansion module, message digital input 1 0191h Expansion module, message digital input 2 0192h Expansion module, message digital input 3 0193h Expansion module, message digital input 4 0194h Expansion module, message digital input 5 0195h Expansion module, message digital input 6 0196h Expansion module, message digital Output 6
Operating hours Compressor/Pump 1	01Ah (H) 01Bh (L)	
Operating hours Compressor/Pump 2	01Ch (H) 01Dh (L)	
Water meter cumulative sum in litres	01Eh (H) 01Fh (L)	
Bus module status	020h	0200h No connection between bus module and controller 0201h MK200 design
Type	021h	1 Variomat 2 Variomat Giga 3 Reflexomat/C 4 Servitec 5 Fillcontrol Auto (only for "Control basic“) 6 Servitec-25 – Only for "Control Basic" 7 Servitec-30 – Only for "Control Basic" 8 Fillcontrol Auto Compact – Only for "Control Basic" 9 Fillcontrol Plus – Only for "Control Basic"
Operating state	024h	0248h "MANUAL" operating mode 0249h "STOP" operating mode 024Ah "AUTO" operating mode

7 Operating state display on the web browser

An HTTP server is integrated in the bus module, providing you with access via web browser (if Java/JavaScript is installed).

Proceed as follows:

- Enter this address: https://<IP Address>/nwconfig.html.
  - Use the defined IP address of the bus module for "<IP Address>“.

The website displays the current values of the Reflex controller which are automatically and continuously updated.

If the values are not displayed, you can open a static page without running Java.

Proceed as follows:

- Select "Status display without Java".
  - In this case, you must manually reload the website to display the new values.

8 Diagnosis

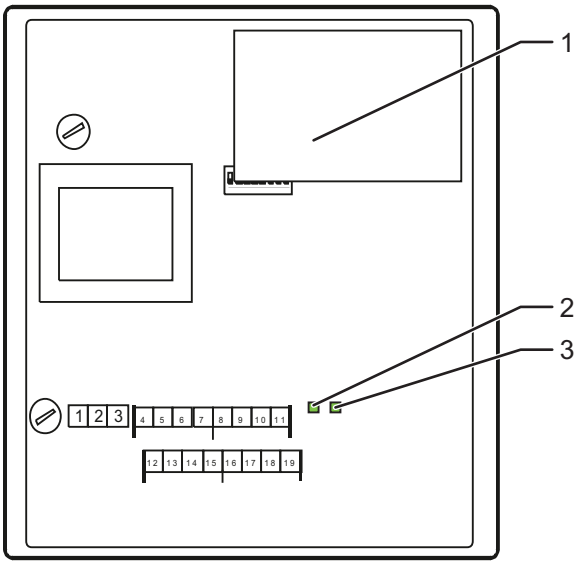
Danger – electric shock!

- Risk of serious injury or death due to electric shock. Some parts of the main board may still carry 230V voltage even with the device physically isolated from the 230 V power supply.
  - Before you remove the covers, completely isolate the device controller from the power supply.

The bus module features 6 LEDs indicating the operating state.

- LED1 and LED2 are located in the terminal space next to the terminal strip for the interfaces.
- LED3 to LED6 are located on the Ethernet plug-in module.

LED 1 and LED 2 in the terminal space



No.	Component
1	Ethernet plug-in module
2	LED 1

No.	Component
3	LED 2

LED 1 function:

Visual signal display of the controller connection

- Illuminated in normal mode.
  - The LED illuminates when a connection to the controller is established.
  - The LED flashes when there is no connection to the controller.

LED 2 function:

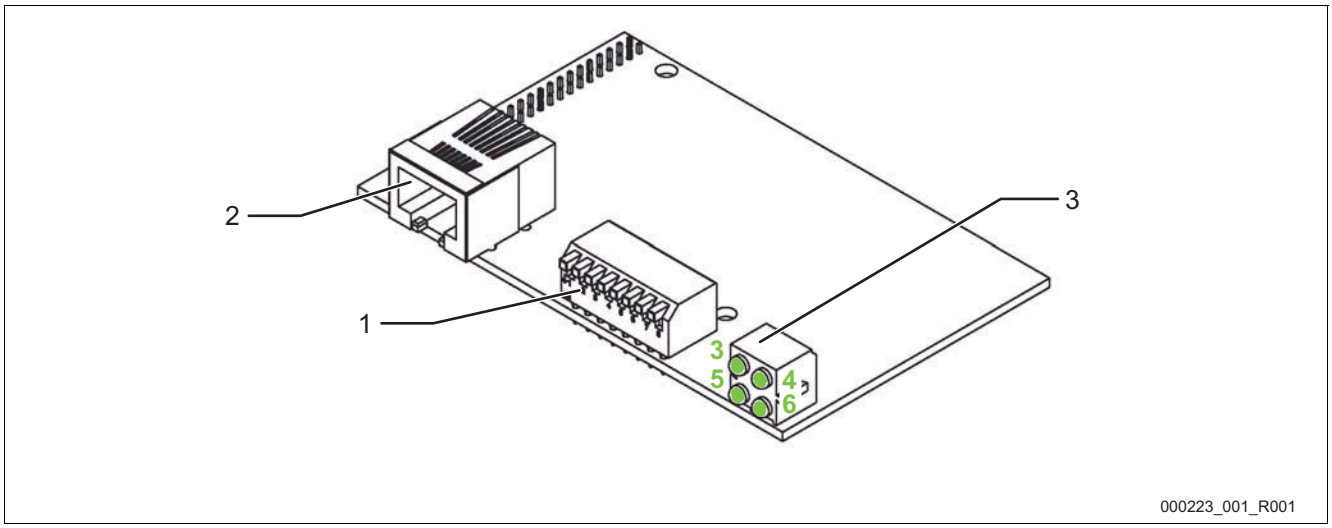
Visual signal display for the detection of the field bus module.

- Switched off in normal mode
  - The LED flashes when the Ethernet plug-in module has not been detected.

Alternate flashing of the LEDs 1 and 2 indicates that the bus module is in "firmware update" state:

- DIP switch 8 is set to "ON".
- A previous firmware update has been aborted.

LEDs 3 to 6 on the Ethernet plug-in module



No.	Component
1	DIP switch
2	Ethernet connection

No.	Component
3	LEDs 3 to 6

LED 3 function:

Visual signal for the Ethernet link.

- The LED illuminates "green" when the bus module is connected to a "hub".
  - Independent of data transmission.

LED 4 function:

Visual signal for the bus module status.

- The LED illuminates "green".
  - The bus module works correctly.
- The LED flashes "green" or "red".
  - Fault in the bus module.
- The LED illuminates "red".
  - Fault in the bus module.

LED 5 function:

Visual signal for data transmission.

- The LED illuminates during data transmission.

LED 5 function:

Visual signal for the network status.

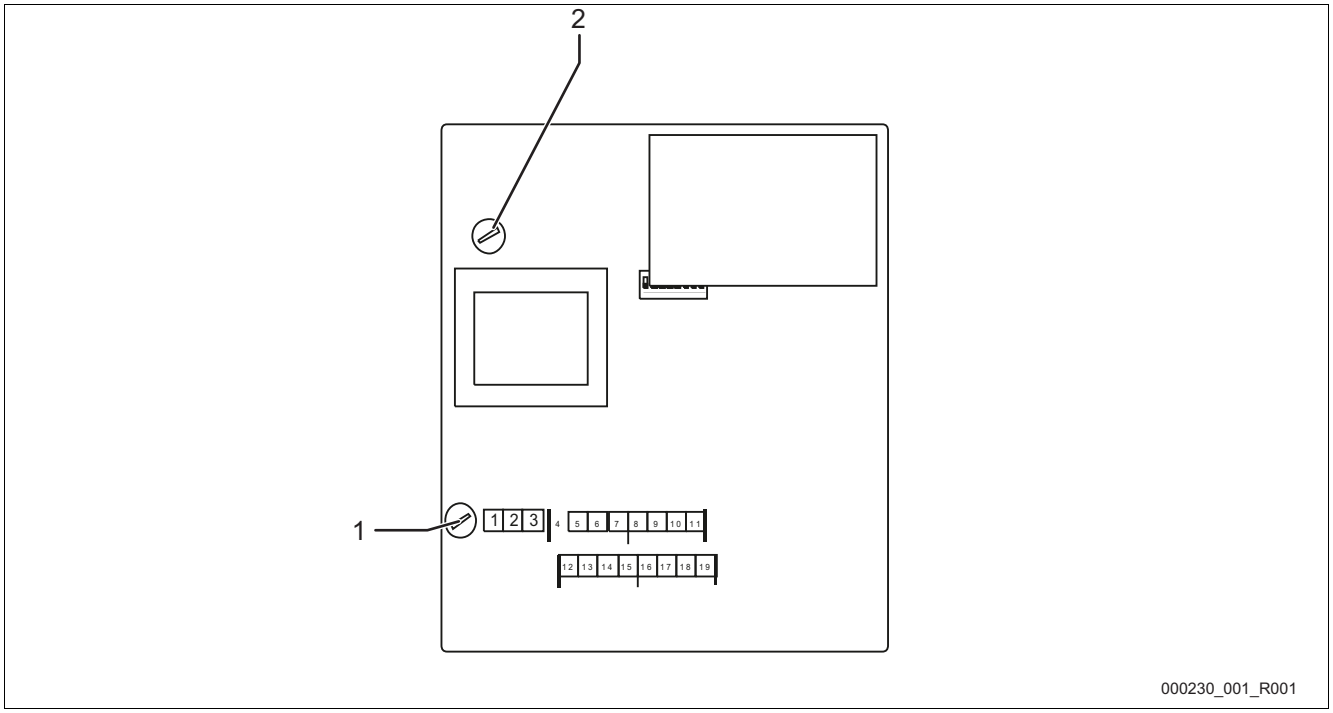
- The LED is off when no IP address is assigned.
- The LED flashes "green" when an IP address is assigned.
- The LED illuminates "red" when the assigned IP address is used by another device.
- The LED flashes "red" when "time-out" errors have occurred.

9 Replacing the fuses

Danger – electric shock!

- Risk of serious injury or death due to electric shock. Some parts of the main board may still carry 230V voltage even with the device physically isolated from the 230 V power supply.
  - Before you remove the covers, completely isolate the device controller from the power supply.

The fuses are installed in the terminal space of the bus module.



No.	Component
1	Feeble current fuse F1 • 250 V • 0.25 A time-lag

No.	Component
2	Feeble current fuse F2 • 250 V • 0.8 A time-lag

Proceed as follows:

1. Disconnect the bus module from the power supply.
   - Pull the power plug from the bus module.
2. Open the housing cover.
3. Replace the defective fuses.
4. Close the housing cover.
5. Reconnect the power supply for the bus module.

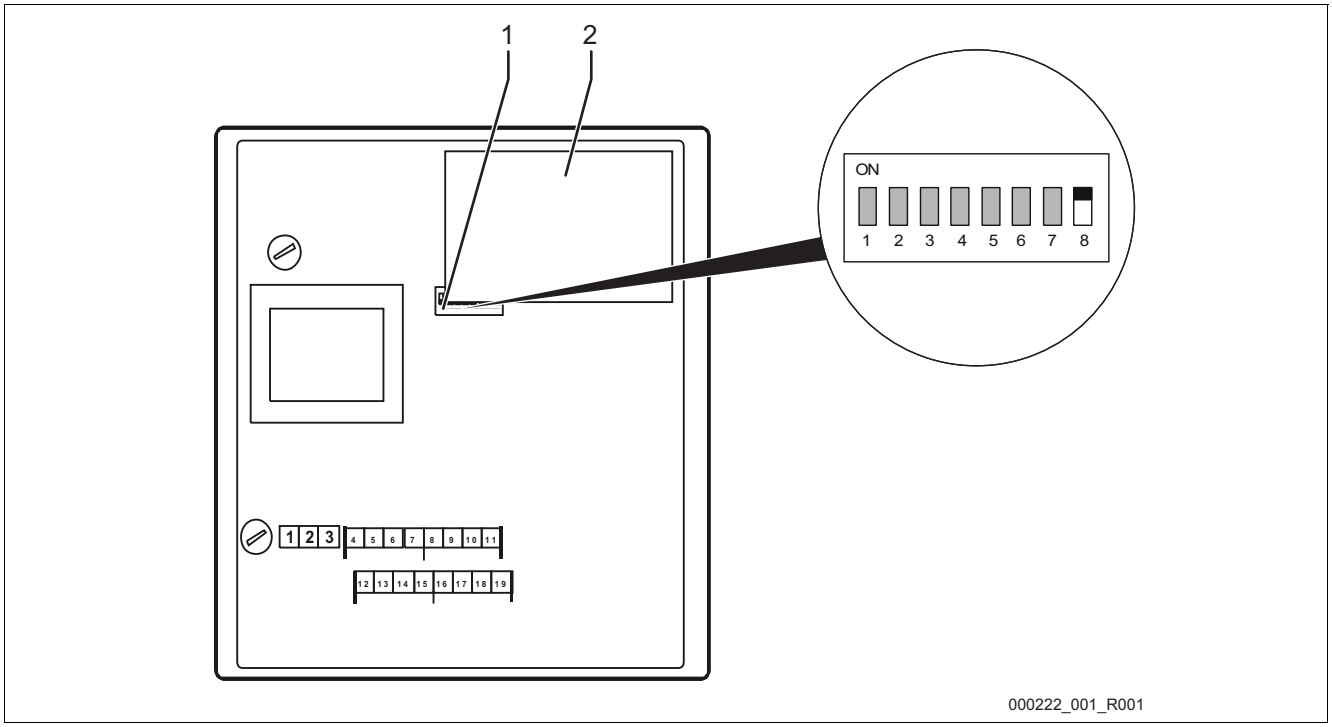
The fuse replacement is completed.

10 Firmware update

Danger – electric shock!

- Risk of serious injury or death due to electric shock. Some parts of the main board may still carry 230V voltage even with the device physically isolated from the 230 V power supply.
  - Before you remove the covers, completely isolate the device controller from the power supply.

A new firmware version is loaded to the bus module using the "COM1" serial interface.



No.	Component
1	DIP switch

No.	Component
2	Ethernet plug-in module

To load the new firmware to the bus module, you need:

- A PC with an RS – 232 interface.
- A software for flash programming for the PC.
  - flash-xxx.exe
- The new firmware for the bus module (*.hex).

To connect the "COM1" interface, you have two options:

- COM 1 RS – 485.
  - Terminals 4 – 7
- COM 1 RS – 232
  - Terminals 12 – 15

Connect a "COM1" of the bus module with the RS-232 interface of the PC.
You need:

- RS – 232/RS – 485 converter.
  - For terminals 4 – 7
- Optional flash programming adapter.
  - For terminals 4 – 7
- Optional cable for the direct connection of the PCs RS – 232 interface with the bus module.
  - For terminals 12 – 15

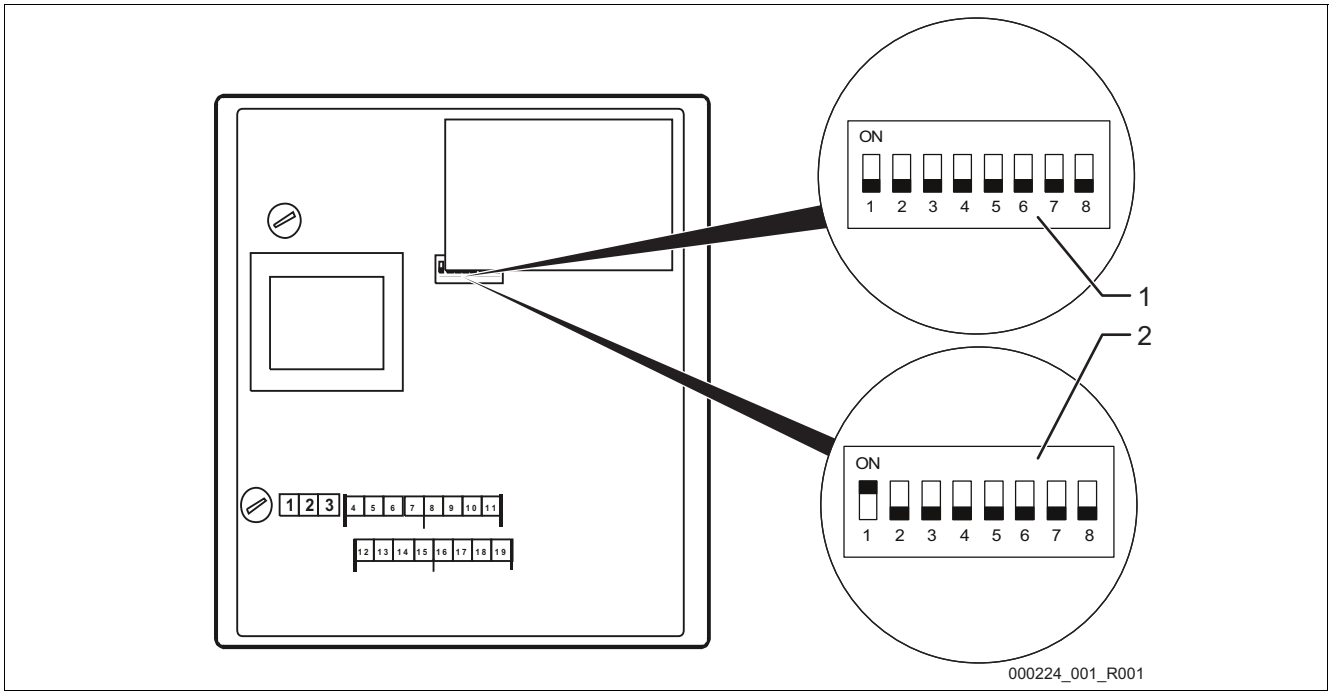
To load the new firmware, proceed as follows:

1. Disconnect the bus module from the 230V power supply.
2. Open the housing cover.
3. Set the DIP switch "8" to "ON".
   - Do not change the settings of the other DIP switches "1 – 7".
4. Remove the connection between the Reflex controller and the bus module.
5. Connect the selected "COM1" interface with the PC.
6. Close the housing cover of the bus module.
7. Connect the bus module to the 230V power supply.
8. Start the "Flash programming" program on the PC.
9. In the program, click "Open".
10. Select the required HEX file in the program.
11. In the program, click "Burn".
    - If necessary, change the interface setting in the program.
12. Click "OK" to start the programming process.
13. Close the program when programming has completed.
    - The status bar displays the progress of programming.
14. Disconnect the 230V power supply of the bus module.
15. Open the housing cover of the bus module.
16. Disconnect the "COM 1" connection between PC and bus module.
17. Re-connect the Reflex controller and the bus module.
18. Set the DIP switch "8" to "OFF" for the bus module to enter the operating mode when switched on.
    - Do not change the settings of the other DIP switches "1 – 7".
19. Close the housing cover of the bus module.
20. Re-connect the 230V power supply of the bus module.
21. Check the functioning of the bus module.

Loading the new firmware to the bus module is completed.

11 DIP switch

DIP switch settings



DIP switch:	Designation:
Magnifier 1 (optional)	Bus module for Ethernet • Standard design
Magnifier 2 (optional)	Bus module for Ethernet • MK200 design • Module bus interface version Control Touch » RS485-s2
1	"COM1" interface function. • "ON": Slave • "OFF": Master
2	Selection of the used field bus plug-in module. • "ON": RSI Profibus module (Profibus bus module) • "OFF": HMS AnyBus module (other bus modules)
3	Reserved

DIP switch:	Designation:
4	Reserved
5	Reserved
6	FTP and Tenet activation. • "ON": FTP and Telnet activated (for diagnostics) • "OFF": normal mode
7	Switch to configuration mode. (currently only internally used by RSI) • "ON": Configuration mode • "OFF": normal mode
8	Switch to firmware update mode. • "ON": Firmware update • "OFF": normal mode

Note!

Change the DIP switches when a firmware update is executed on the bus module.

Note!

The bus module reimports the DIP switch settings when the power supply is switched on or off.

12 Annex

12.1 Reflex Customer Service

Central customer service

Switchboard: Telephone number: +49 (0)2382 7069 - 0
Customer Service extension: +49 (0)2382 7069 - 9505
Fax: +49 (0)2382 7069 - 523
E-mail: service@reflex.de

Technical hotline

For questions about our products
Telephone number: +49 (0)2382 7069-9546
Monday to Friday, 8:00 a.m. – 4:30 p.m.

SIXXXXen / 91XXXXX / 04-14

reflex

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www.reflex.de

Z14 Schedule of Pressurisation Units

Unit Reference	PRZ-04-001 & PRZ-04-002
Function	PCW System pressurisation and water make-up
Quantity	2
Location	Dock Water Cooling Pump Room
Duty load	5000 kW
Flow / Return temp	22/28 ^{o}C
Static height above unit	28 m
Fluid	Water
Power supply	240V/1ph/50Hz
Current FLC (A)	23
	Expansion/Buffer Vessel
Quantity	2
Size (each)	100 L
Type	Bladder expansion vessel

Notes

1. Manufacturer: Reflex or equal and approved
2. To come with make-up and degasser unit
3. The complete installation shall be on skid mounted units and supplied with the following:
    a. 1x free standing control cabinet to suit (inc. control touch unit)
    b. 1x fillset RPZ based water make-up assembly (with contact water meter)
    c. 1x I/O extension module (optional)
    d. 1x MODBUS extension module
4. Refer to clause Y11 of the project specification