Flow Indicator / Integrator
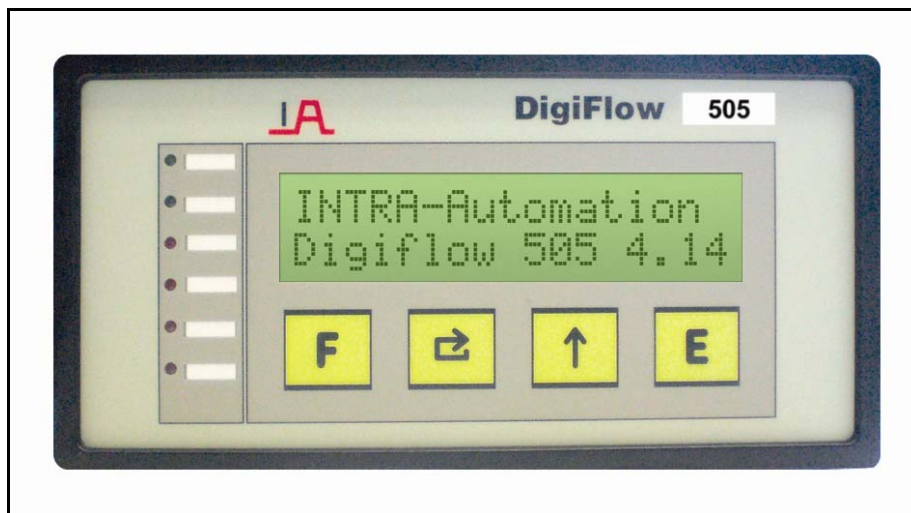
DigiFlow
Type: 505

Operation Manual

Software version: 1.20 or higher

Intra-Automation GmbH
Otto-Hahn-Straße 20
41515 Grevenbroich

August 10
ba_df505_en

Proposals or comments to this brochure please address: info@intra-automation.de.

Technical details subject to be changed!

List of Contents

1. Safety instructions

In this manual you will find information for your own safety and to prevent any type of damage. The hints are marked with a danger sign described as follows:

DANGER
means, that death, personal injury or high damage to property **will** occur, if there should be taken no precausion.

WARNING
means, that death, personal injury or high damage to property **can** occur, if there should be taken no precausion.

CAUTION
with danger sign means, that only small personal injuries can occur, if there should be taken no precausion.

CAUTION
without danger sign means, that damage to property can occur, if there should be taken no precausion.

ATTENTION
highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.

NOTE
Is an important information about the product itself, the handling of the product or that part of the manual to which special attention is to be drawn.

Limited liability

We checked the content of the manual in accordance to the hardware. But we can not guarranty that there will be differences between the manual and the hardware. The manual will be checked regularly to correct the manual in the following versions.

Copyright © Intra-Automation GmbH 2010 All rights reserved

2. General Instructions

NOTE

For reasons of clarity the manual does not contain detailed information about all types of products and cannot take into account every conceivable case of installation, operation or maintenance.

If you require further information or should any problems occur which are not sufficiently explained in the manual, you can consult your local Intra-Automation branch to obtain the necessary information.

May we also draw your attention to the fact that the contents of the manual are not part of a previous or existing agreement, approval or legal relationship or an amendment thereof. All obligations of the Intra-Automation GmbH result from the contract of purchase which also contains the full and solely valid warranty agreement. These contractual warranty conditions are neither extended nor restricted by the contents of the manual.

The contents reflect the technical state at the time of going to print. They are subject to technical modifications in the course of further development.

WARNING

Intrinsically safe devices lose their license as soon as they are operated on circuits which do not meet the requirements of the EC test certificate.

The device may be operated with high pressure and corrosive media. Therefore serious injuries and/ or considerable material damage cannot be ruled out in the event of improper handling of the device.

The perfect and safe operation of this equipment is conditional upon proper transport, proper storage, installation and assembly as well as on careful operation and commissioning.

The equipment may only be used for the purposes specified in this instruction manual.

Exclusion of liability

All modifications to the device require the expressed approval of the manufacturer..

Qualified Personnel

Qualified personnel is persons familiar with installation, commissioning and operation of the product and wo have the appropriate qualifications for their activities, such as:
- training or instruction or authorization to operate and maintain devices/ systems according to the standard of safety technology for high pressures and corrosive media.
- training or instruction according to the standards of safety engineering in the care and use of suitable safety equipment.
- training in first aid.

CAUTION

Modules which are sensitive to electrostatic charge may be destroyed by voltages which are far below the human level of perception. These voltages occur already when you touch a component or electrical connections of a module without first discharging yourself electro-statically. The damage incurred by a module as a result of an overvoltage is not usually immediately perceptible but only becomes noticeable after a long time in operation.

Trade mark

DigiFlow is a trade mark of Intra-Automation GmbH.

3 Introduction

The flow indicator **DigiFlow 505** is mostly used to display the value of the flow of fluidsor gases in pipes.

Since the **DigiFlow 505** scalable integrates any physical unit which is converted into 4-20 mA analogue or frequency signal, it is possible to display not only the flow throughput or other time-dependant values. Therefore the user has to enter a dimension text with up to 5 characters length.

The most common use of the **DigiFlow 505** is as flow indicator.

Inputs from a variety of flow meters are accepted. Examples of these sensors are Vortex, turbine, orifice plate, averaging pitot tube (**Itabar**-flow-sensor), wedge and target flow meter.

To increase the measured flow range of an **Itabar**-flow-sensor, it is possible to use two differential pressure transmitters which ranges overlap with automatic crossover the computer.

The device includes a scalable pulse output and two scalable alarm relay outputs.

Optionally this computer includes:
♦ 1 or 2 analogue outputs 0/4…20 mA
♦ RS485-interface
♦ control relays for a sensor purge unit

A uniquie feature available with the serial interface is the ability to print flow rates and totals at programmable time intervals. This enables the instrument to function as a data logger when used in conjunction with a printer or other storage device.

Code	Option or Feature						
505	Flow Indicator – Integrator, type: DigiFlow 505						
	Code	**Housing**					
	S	Panel mounting IP54 (standard)					
	T	Panel mounting with lockable transparent door IP55					
		Code	**Power supply**				
		2	230 V AC line voltage (standard)				
		1	115 V AC line voltage				
		4	24 V AC/DC power supply				
			Code	**Analogue outputs**			
			X	Without (standard)			
			1	1 Analogue output			
			2	2 Analogue outputs			
				Code	**Communication port**		
				2	RS232 – Interface (Standard)		
				4	RS485 – Interface		
					Code	**Relay output**	
					S	Relay for high and low alarm	
					L	Relay for high and low alarm and sensor purge unit	
505							

4 TechniƘ˙8ƙƎ

General:

Display:	Backlighted, alphanumeric LC–Display, 16 cols. Each char is 0.413" high.
Keyboard:	Sealed membrane keyboard with four keys.
Transmitter supply:	18 V / 100 mA; via keyboard adjustable, isolated.
Power:	115/230 V AC; 50/60 Hz internally switchable.
	Optionally 24-28 V AC/DC
	Power consumption 10 W @ 230 V AC without Options.
Operating Temperature:	32 – 131 °F
Housing:	Enclosure: glass–fiber reinforced synthetic material; Front: aluminum keyboard membrane.
Face:	Watertight to IP 54 (NEMA 4X equal)
Dimensions:	5.7" W × 2.8" H × 5.1" D
Panel cutout:	5.4" W × 2.6" H

Programming and Configuration:

Handheld:	There is no handheld terminal required. All necessary constants and parameters are programmed using the keypad.
Language:	German, English or French selectable.

Frequency Input:

Frequency Range:	0.25 - 10 kHz Input 1.
	0.25 - 500 Hz Input 2.
Input Circuits:	Most AC, logic and proximity switches accepted. 0.5 – 50 V_{pp}.
Non–Linear Correction:	Up to 12 points for curve fit.

Analog Input 4 – 20 mA:

Inputs:	2 for flow (split range).
Input Impedance:	120 Ω.
Circuit:	All inputs are isolated, no common ground.

Pulse Output:

Pulse Width:	Adjustable between 10 ms and 90 ms.
Duty Cycle:	≥ 1 : 1.
Logic:	Open Collector, Active Low.
Current sinking:	max. 100 mA.
Pulse generation:	The pulse count is proportional to the counter difference in selectable units of 10 (1, 10, 100, ...100000).

External Keyboard:

Function:	One input controls the display and one input resets the total-counters.
Circuit:	An input voltage higher than +18 V is detected.

Communication Port:

Type:	An RS232 interface is provided. Optionally there is a RS485 multipoint communication interface for up to 32 instruments connected to a common bus.
Baud Rate:	300 – 9600 Baud.
Data Bits:	7 or 8 selectable.
Parity:	None, even or odd.
Stop Bits:	1 or 2 selectable.
Data logging:	Output in intervals up to 9999 min or by key stroke.

Relay Output:

Function:	High– and Low–flow rate alarms based on the flow rate.
Form:	Normally open. (SPST)
Max. Voltage	250 V AC
Max. Current	6 A AC

Options:

Analog Outputs:

Function:	Selectable: Output current proportional to standard display. Setpoints at 4 mA and 20 mA, linear interpolation between.
Output Span:	0 – 20 mA or 4 –20 mA selectable.
Resolution:	12 Bit
Max. Load:	500 Ω internally powered.
	800 Ω externally 24 V powered.
Powering:	If there is no external supply >15V the output will be internal powered automatically.

**Control of a Sensor–Purge–
Unit:**

Function:	Two relays control the solenoid activated valves of a Sensor Purge Unit. During the purging time and an additional selectable time after purging, the flow input is maintained.
Time between purging:	10 minutes to 31 days 23 hours 50 minutes.
Purge Duration:	1 to 999 s
Time Constant:	1 to 99 s

5 Basic Equations

5.1 General Equation

The displayed value is calculated usindg the following equation:

$$displayed\ value = \min imum\ value + A^{\exp} * \max imum\ value$$

with:

A = normalized input signal 0…1

exp = correction exponent (0,5 when square rooting a differential pressure signal)

Besides the free choice of the exponent also the determined exponents 0,5 for square root operation and 2,0 for square operation can be chosen while parameterizing.

5.2 Split range measurement

A special feature is the split range measurement for analogue inputs. Here, according to the value of the first input signal, the first input or the second input will be computed. The first input is to be programmed with a small span, the second input with a large span. Once the input signal exceeds 19mA (93,75 % of span), the second input will be calculated with a different span. If the signal at input 1 goes under 18,4 mA (90 % of span), input 1 is to be computed again.

5.3 Averaging (Summarization)

An additional special feature of the analogue inputs is the possibility to average 2 inputs weighted or, according to the programmed span, to summarize.

Here the total span and the weight of the first input has to be entered. The weight of the second input is calculated internally as the difference from 100 % span.

Two examples:

Example 1 – Averaging:
At a measuring point two measuring value sensors are measuring the same variable. This can be e.g. a flow measurement with two flow sensors. To raise the reliablity and elimination of inhomogene currents the sensors are mounted crosswise. Max. flow: 100 m³/h.

A span of 0-100 m³/h and a weight of the first sensor of are to be programmed.
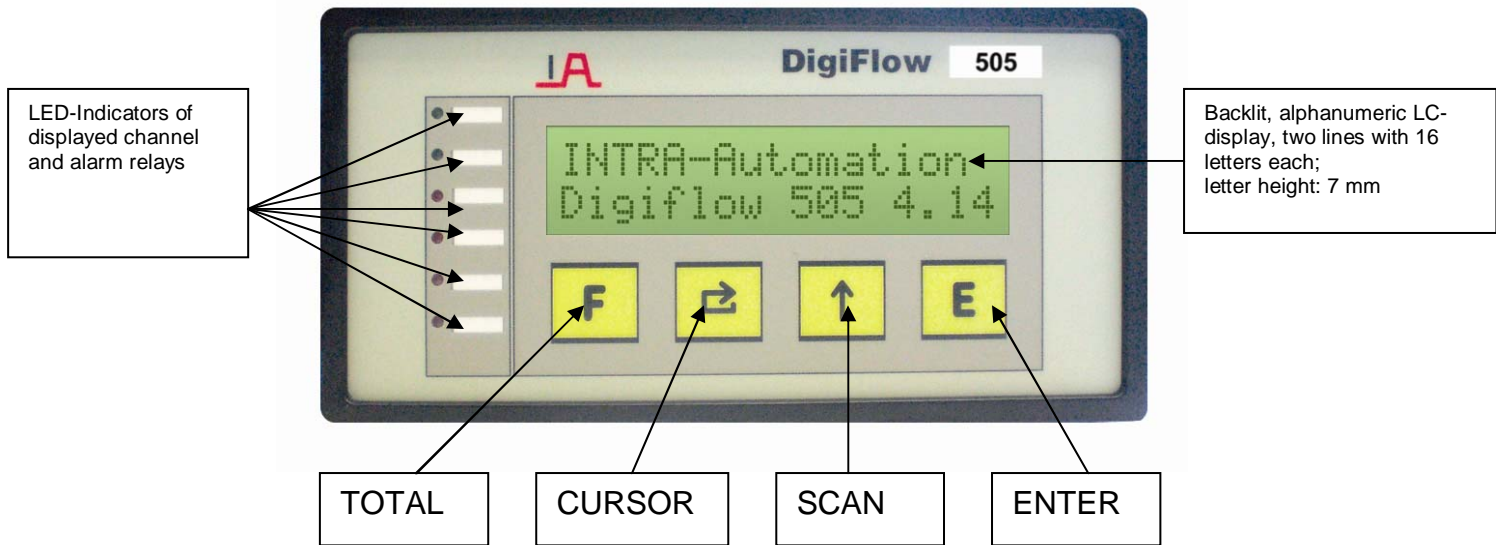
Example 2 – Summarization:
To flows are measured, which lead into one pipe later on. The first pipe can provide a flow of 0-150 m³/h and the second pipe can provide a flow of 0-50 m³/h.

A span of 200 m³/h as sum of both measured flows and a weight of 75 % for the first sensor are to be programmed.

Please note that the summization only works with linear characteristics.

6 Operation

6.1 Front view

LED-Indicators of displayed channel and alarm relays

Backlit, alphanumeric LC-display, two lines with 16 letters each; letter height: 7 mm

| TOTAL | CURSOR | SCAN | ENTER |

6.2 General

The Digiflow 505 works with a CMOS-microprocessor that processes all measurements and takes all control functions.

All operational parameters and calculation constants are programmable and stored in a non-volatile memory which keeps the information after energy loss for a least 40 years.

During normal operation the following displays can be selected by means of pressing the SCAN-key:

♦ Rate or Total-Display
♦ Time
♦ Date

By pressing the TOTAL–key and when having time dependent input signals, like flow or speed, the display is toggled between rate and total viewing. If you have a higher display level, time or date, you switch back to main display.

A higher display level is also exited without any key actuation after about 60 seconds.

Ist eine der aufsummierten Mengen in der Anzeige, so können Summenzähler mittels der CURSOR-Taste gelöscht werden. Diese Funktion ist während der Konfiguration sperrbar.

If the accumulated flow is displayed, the sum counters can be deleted about the CURSOR-key. This function can be inhibited at the configuration.

When simultaneous pressing TOTAL and SCAN keys, the computer will switch into the parameter and configuration mode. Here all inputs needed for your special application are to be made. Inside this specific level the keys change partly their function. By means of the SCAN-key you are scrolling through the menu items of a menu-level one by one. The ENTER-key activates the indicated menu item. If numbers have to be entered, the position of this number is selected by the CURSOR-key. The number to change is indicated flashing. This number can now be changed by means of the SCAN-key. The TOTAL-key sets the value to „0".

6.3 Damping of input signals

Reading the instantaneous measuring correctly often is impossible because of the frequency fluctuations or output current fluctuations of the flow measuring instrument created by the pulsating flow.

Therefore the flow calculator is provided with a digital filter which average out these fluctuations of the flow signal and facilitates through this a more precisely reading of the measured values.

The following diagram shows an input signal pulsating and the effect of the filter on this signal.
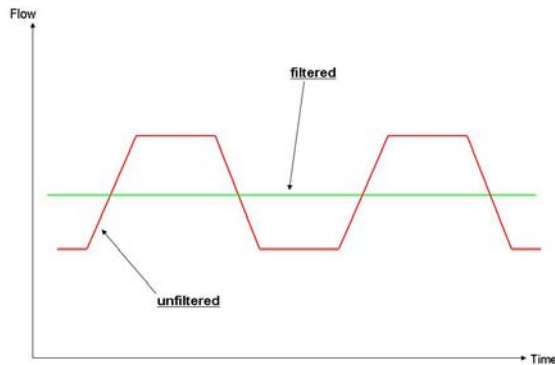
As guideline to the degree of filtering to be used, the following table shows the response to a step change in input. The value F is the entered filter constant.

The times, after the value reported on the display 90 or 99% of the at the ending worth reaches, is indicated in seconds. For the value F = 1 therefor no filtering is executed.

F	90 %	99 %
1	0	0
2	1	2
4	2	4
6	3	6
10	5	11
15	8	17
20	11	22
25	14	28
35	20	40
45	25	51
60	34	69
75	43	86
90	52	103
99	57	113

Table 1: Response time in seconds on a volatile modification of the input signal

6.4 Non-Linearity-Correction

6.4.1 Linearization for the frequency input

Known nonlinearities of a flow measuring instrument can be corrected.

12 frequencies and scale factors are available to this. Data on the flowmeter non-linearity can usually be supplied by the flowmeter manufacturer in the form of a Calibration Certificate, and is the result of individual tests on flowmeter over a range of flow rates. The certificate will list a number of flow rates or frequencies with the measured k-factor at each flowrate.

The following diagram shows an example for the different scaling factors at various frequencies of an arbitrary flow measuring instrument. The broad black turn stands for the current scaling factor of the set, and the narrow line is for the approximation in the flow calculator.
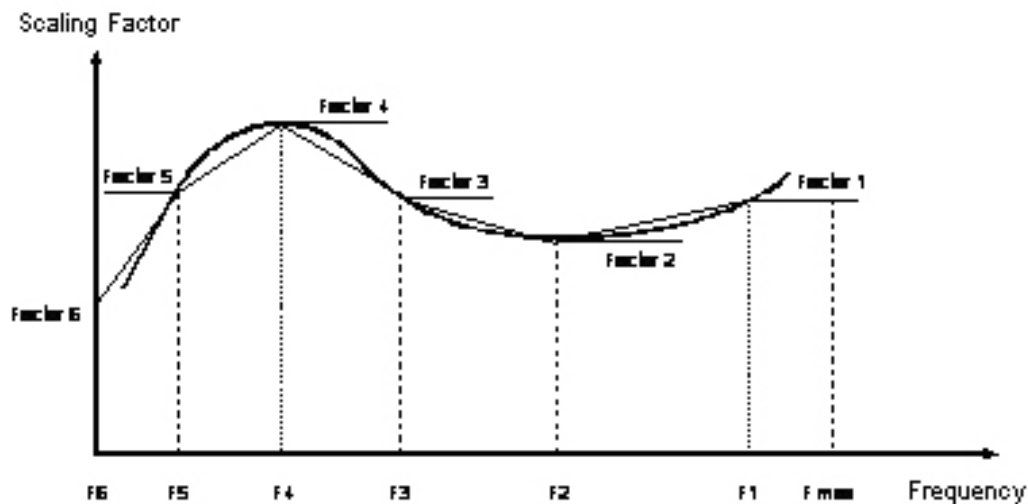
The curve between the single dots was won by linear interpolation, except for factor 1 which maintains a constant value between Frequency 1 and the maximum input frequency.

During Calibration, the user have to enter a frequency and the corresponding k-factor for each of maximum 12 point.

If a frequency with 0Hz is entered, the program doesn't expect any further correction data. If all 12 correction points are used, the 12th frequency is set on 0Hz automatically.

6.4.2 Linearization for the analogue input

Once only one flow signal is connected to the flow calculator, a linearization can be programmed for this to compensate for deviations of flow signal and actual flow. Up to 12 Dots can be entered, between worth be interpolated linearly. The correction is done at the standardized device signal (0…1) , so that measure begin and measure end are not affected. Programming of corrections points start with '1', if a '0' is entered no further inputs are accepted.

The flow correction is defined as:

$$Q = span * A_C$$

NOTE
The square root relationship for conventional differential pressure flow devices is handled separately and not by the linearity correction described in this section.

7 Programming und Parameter Setting

7.1 Key description

The keys on the front side of the device have the following functions:

Pict.	Name	Function at normal operation	Function at parameter setting
F	TOTAL	Switches between sums and instant value display	Presets at number input the actual digit to „0".
↩	CURSOR	Resets (once displayed) and allows the sum counters.	Positions the cursor at number input one position right.
↑	SCAN	Switches between display levels	Increases at number input the digit by 1, else next parameter of the chosen level.
E	ENTER	without function	Accept number, resp. Switch to selected menu level.

7.2 Configuration of a device

By using the flow chart for parametrizing it is possible to enter and check the needed parameters or checking the input signals.

By pressing simultaneously the TOTAL– and the SCAN–key the configuration mode is entered. Then the user defined password must be confirmed after input with the ENTER-key. This password is at the new set: '**0000**'.

If moving step by step through the levels, always a description of the actual parameter is shown for clarification.

To leave this configuration mode, the menu must stepped until the item '**Exit**'. Then the ENTER–key must be pressed.
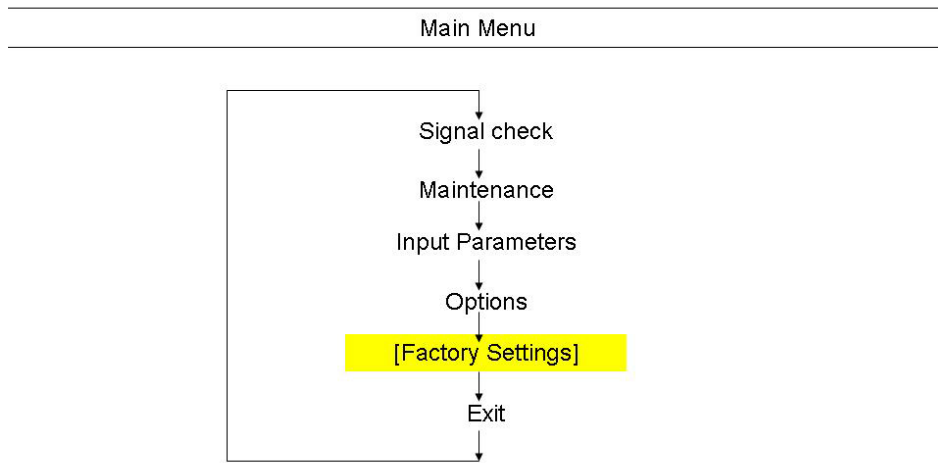
7.3 Input of a number

If the input parameter is a number, so the input proceeds as follows.

By means of the CURSOR-key is jumped the desired place. This place then is changed with the help of the SCAN-key. The cursor lies under the sign, this so is changed. The cursor lies under the decimal dot, this so is moved cyclically by actuation of the SCAN-key around a place to the right. Lies the cursor under a number, this can rapidly with the help of the TOTAL-key with the value `0' be covered.

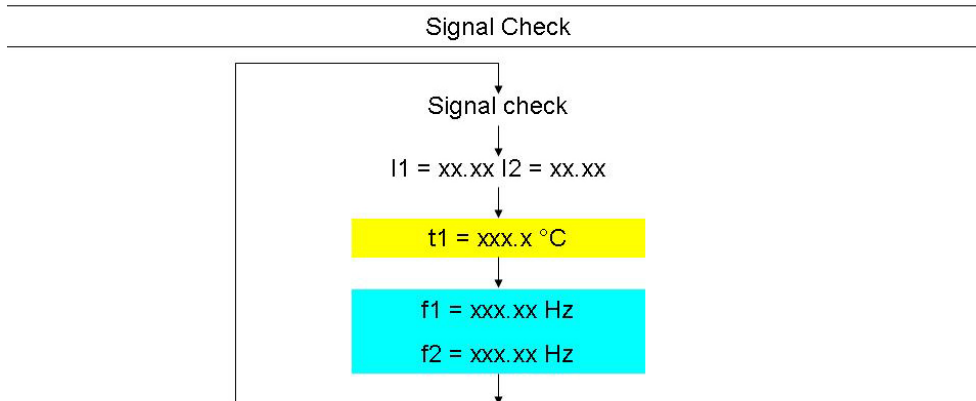By pressing the ENTER–key, the number input will be finished.

8 Flow Charts of the Menus

8.1 Main menu

Main Menu

```
        Signal check
            │
        Maintenance
            │
       Input Parameters
            │
          Options
            │
      [Factory Settings]
            │
           Exit
```

�

= secured by special password

8.2 Signal check

Signal Check

```
        Signal check
            │
    I1 = xx.xx I2 = xx.xx
            │
        t1 = xxx.x °C
            │
        f1 = xxx.xx Hz
        f2 = xxx.xx Hz
```

= only with Pt100 RTD-input

= only with frequency input

8.3 Maintenance

Mainentance

```
       Display Contrast
            │
        Set Clock ──→ Enter Time ──→ Enter Date
            │
        Uext adjust
            │
        Toggle Time
            │
        Main Menu
```
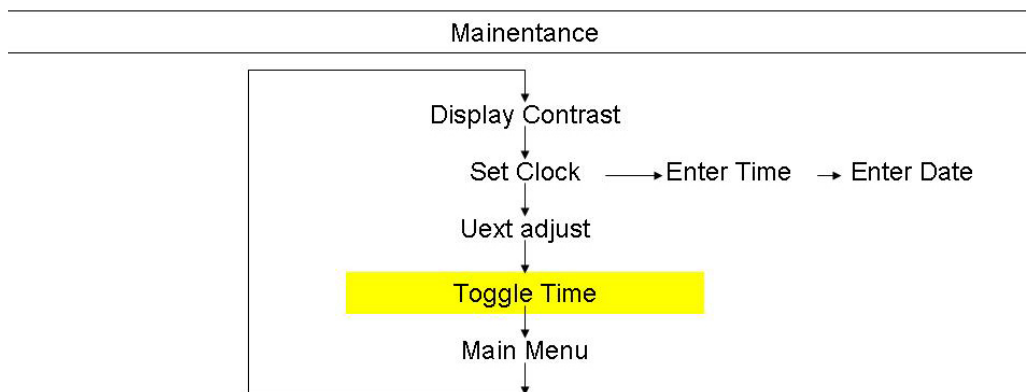
= only for 2-Channel

8.4 Input parameters

Input Parameters

Base Function → 1 Channel / 2 Channel / Split range / Averaging/Summarizing

Unit Text(s) (Text Input for Unit [max. 5 char.])

Time Base → no / Days / Hours / Minutes / Seconds

Signal Input(s) → Pulse (Numeric, pulses per unit) / Frequency) / Analogue

Transform. Character → linear / square root / quadration / open channel → (numeric) / non linear

Frequency Input → Enter Set Points (Coordinates: (f, A))

Analogue Input → Input Values at 0/4 to 20 mA

Decimals Displayed

Damping Factor (Numeric)

Flow Cut-Off (% of input where output = 0)

Main Menu

= not at pulse input

8.5 Options

Options

Language → German
           English
           French

Front Reset → Enabled → Reset now → Yes
              Disabled   No

Total divider → (Numeric)
                Unit text totalizer → (Texteingabe)
                Displayed decimals → (Zahlenwert)

Pulse resolution → (Numeric: Powers of 10 from 1. Totalizer)

Pulse Duration → (10…90 ms)

Alarm Relay → High alarm → (Numeric: Trigger Value)
              Low alarm   [Selection of channel]

Analogue input span → 0…20 mA
                      0…40 mA

Analogue output span → 0…20 mA
                       0…40 mA

Analogue outputs → Selection → Numeric 4 mA
                   Main Display #1
                   Main Dispay #2 → Numeric 20 mA

Communication Parameters → (see diagram next page)

Sensor purte unit → Input cycle time → input purge time
                                        input settle time

Change Password → 1. new password → 2. New password

Main Menu

[yellow highlight] = only when option installed

Communication Parameters

----   ⟶ 7 Data bits   ⟶ no Parity   ⟶ 1 Stop bit

9600 Baud   8 Data bits   even Parity   2 Stop bits

4800 Baud   odd Parity

2400 Baud

1200 Baud

300 Baud

Communication with: ⟶ Interval   ⟶ Sum reset after Print:

⟶ Printer   ⟶ Full-Duplex   Ja

Host Computer   Half-Duplex   Nein

⟶ Input ID (0...32)
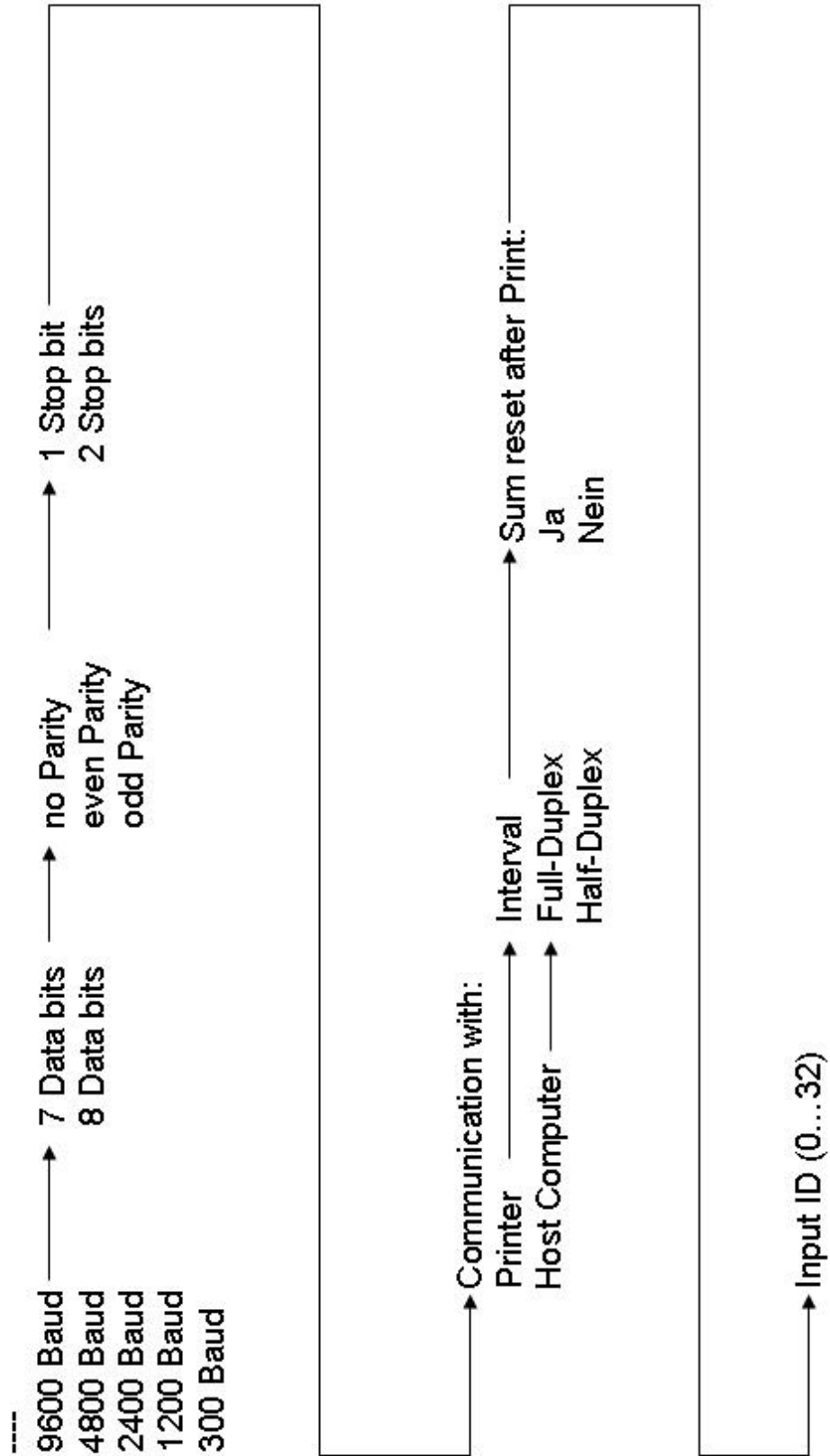
9. Input Ciruits

The DigiFlow 505 has an adjustable supply voltage for transmitters. This voltage can be adjusted in a range of approx. 17.5 -- 19.5V during configuration. A maximum output current of 100mA is allowed

Of the rear side is a DIP switch accessibly. If the flow signal is a frequency signal, the signal type must here be defined.

If the input signal is an analog signal, the DIP switch doesn't have any function.

9.1 Frequency input

The DigiFlow 505 has an input signal-conditioning board, which can process most frequency signals of pressure transmitters. By means of the DIP-Switch the correct flow signal will be selected.

The position of the DIP switches is in the following table in dependence of the input signal listed:

Input signal		Terminal		DIP - switch position			
		+	-	1 CH1	2 CH1	1 CH2	2 CH2
A	active impulse output with large amplitude (12 ... 30 V)	13	17	off	on	off	on
B	passive impulse output (open collector, Reed switch, ...)	13	17	on	on	on	on
C	active impulse output with small amplitude (CMOS, TTL, ...)	13	17	off	off	off	off

The position of the DIP switch #2 is for passive signaling transmitters for channel 1 as same as for channel 2 without meaning.

General data:

max. input voltage: $35\ V_{SS}$
Input impedance: A $30\ k\Omega$
                      C $10\ k\Omega$
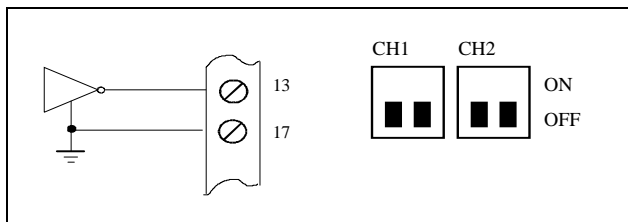

fig. 1: Input signal type: „C" (square wave, CMOS or TTL)

Examples:
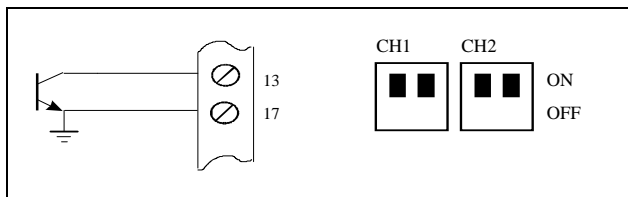Vortex, pre-amplifier, magnetic inductive flowmeters

fig. 2: Input signal type „B" (Open Collector)

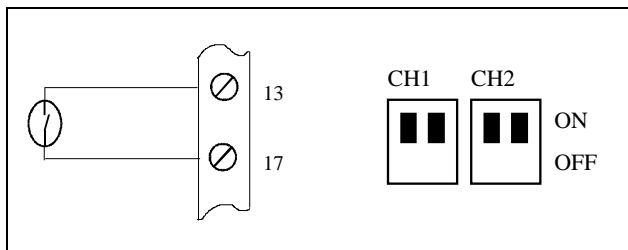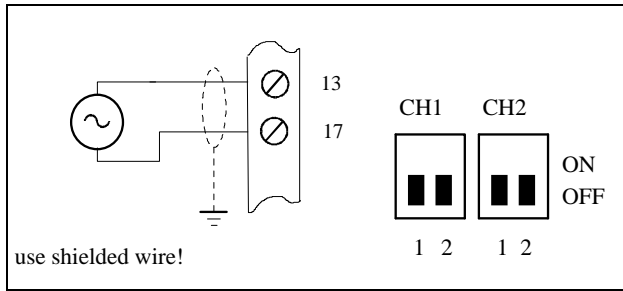Example:
Hall-effect-sensors, opto couplers

fig. 3: Input signal type "B" (Reed contact)

Expample:
Magnetic inductive flowmeters with reed-contact outputs

use shielded wire!

CH1   CH2

ON
OFF

1 2   1 2

13
17

Example:
mV signal from turbine flow meter

fig. 4: Input signal type „C" (Coil or tacho generator)

40
13
17
41

R=1k

CH1   CH2

ON
OFF
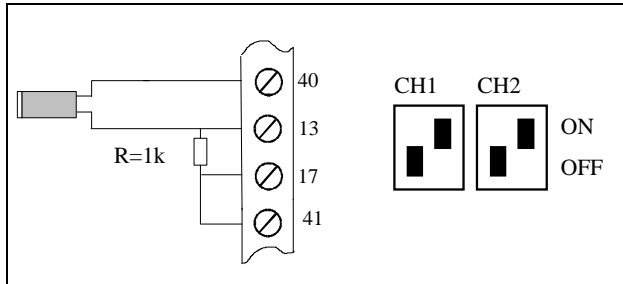
Example:
PDF with proximity switch

fig. 5: Input signal typ „A" (NAMUR-proximity switch)
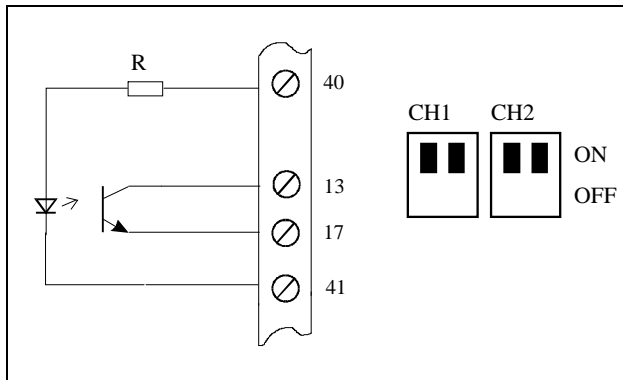
R

40
13
17
41

CH1   CH2

ON
OFF

fig. 6: Input signal type „B" (Opto-Sensor)

9.2 Analogue input

Each 4-20mA input has a load of 120Ω. When the computer is AC powered, there is sufficient current from DC supply output to power up to 4 transmitters. If more loops are to be powered, an external supply source is required.
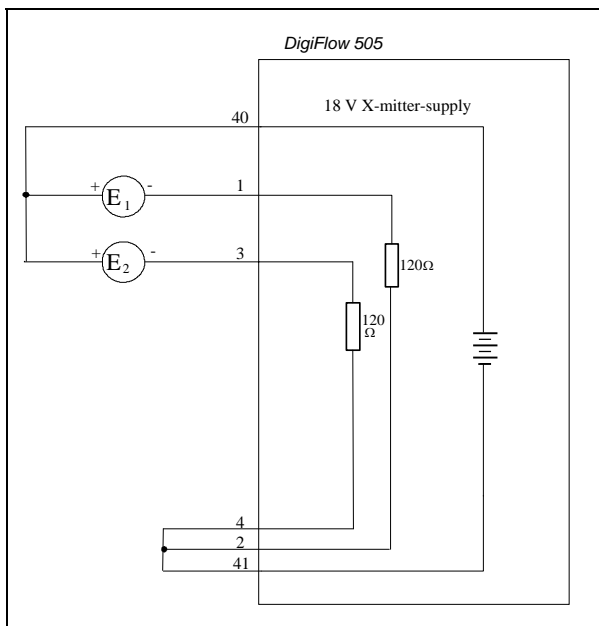
DigiFlow 505

18 V X-mitter-supply

40

$+ E_1 -$ 1

$+ E_2 -$ 3

120Ω

120Ω

4
2
41

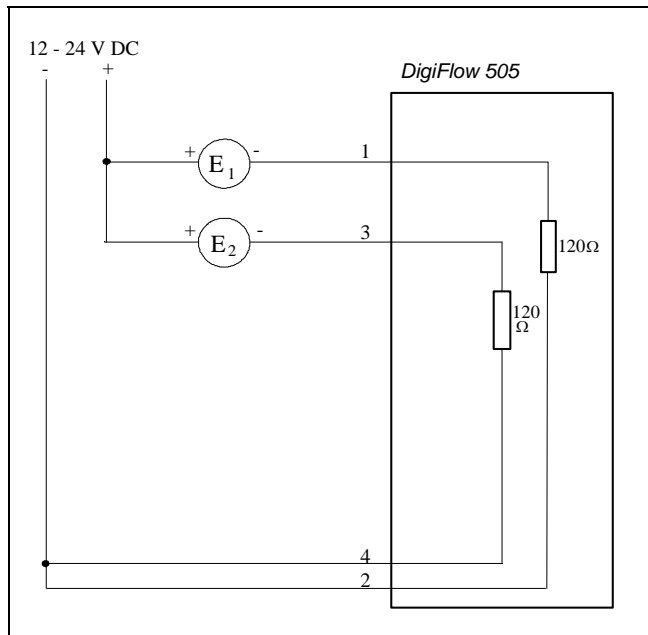fig. 7: Internal tranmitter supply

fig. 8: External transmitter supply

Transmitters can be powered externally. 2 differential pressure transmitters are connected to the set. Is only 1 transmitter used, it's signal will be connected to terminal 1 and 2.

Shielding:: If used shielded signal cables, take care of grounding the shield only at one end. Prefer the DigiFlow end.

9.3 Remote controlled operation

The *DigiFlow 505* has the ability to reset the sums and to switch the display remotely. The Realization of that functions is shown below (fig. 9).
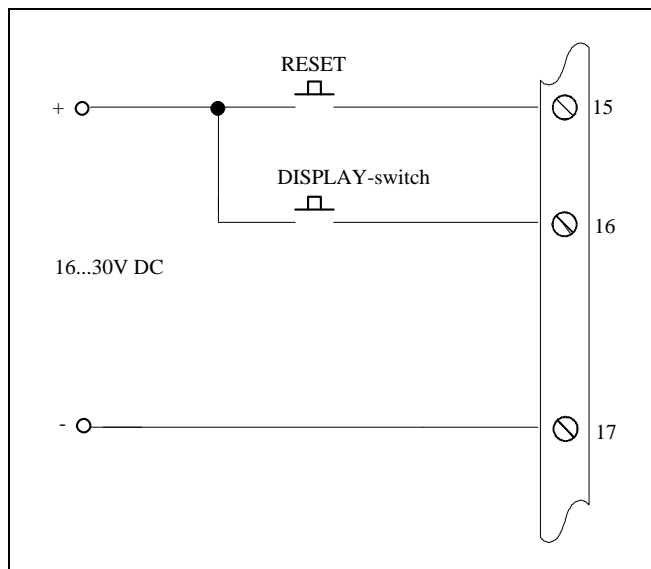

fig. 9: Connection for external keys

10 Output Circuits

10.1 Digital Pulse Output

A digital pulse can be taken from the terminal strip at the back for controlling external meters. At every increase of the accumulated counter of a selected powers of ten, output pulses determined by this increase are generated. If the resolution is selected to be 100.000, then on every increase of the internal counter of 100.000 a pulse is set.

This digital pulse is generated at a NPN-Transistor with open collector output. Pulse width is 10 - 90 ms (selectable). Maximum sink current is 100mA.

When connecting a counter to the pulse output, it may be necessary to use an external pull-up-resistor. A resistance of 5 to 10kΩ connected to terminal 40, are most times sufficient.

Make sure that this output isn't usually suitable for a further flow indicator as input signal because of the not periodical pulse signal, please
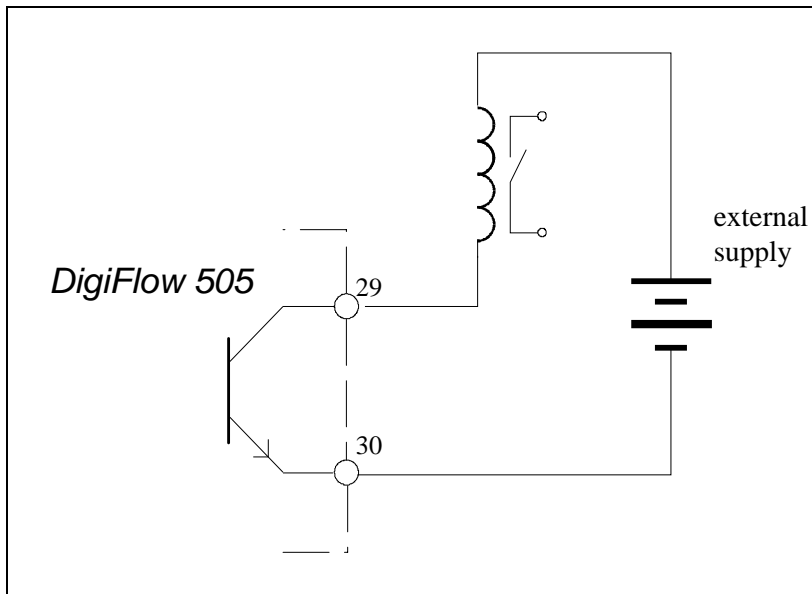

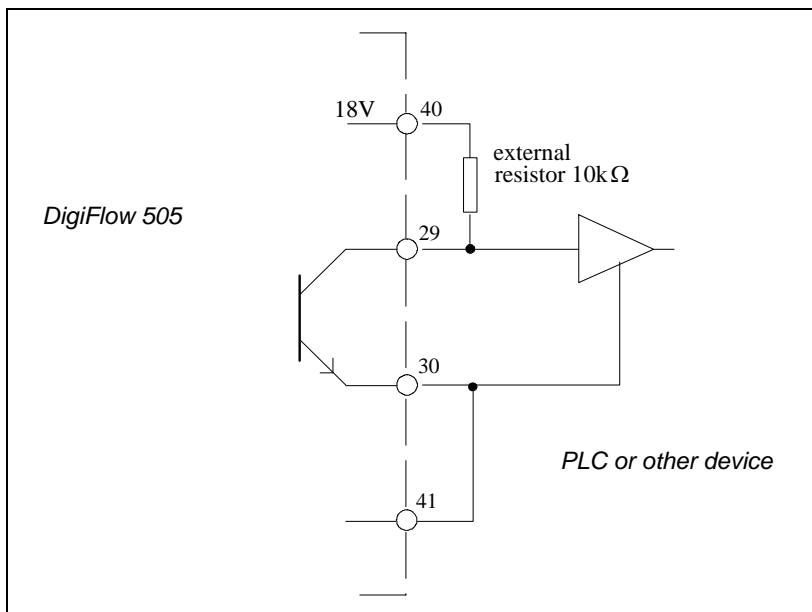fig. 10: Control of external relay or pulse counter.

fig. 11: Control of logic input like PLC or electronic counter.

10.2 Relay Output

The DigiFlow 505 is equipped with tow relays (SPST). They are preset during configuration to energize when the default flow rate exceeds or drops below the preset value. It has to be considered that the set alarm value has to be in-between the measuring range.
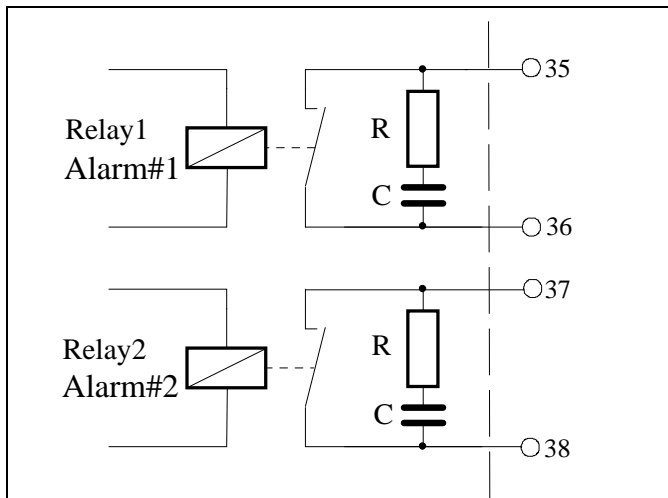

fig. 12: Circuit of relay outputs

10.3 RS232 or RS485-Interface

Either a serial RS232 or a RS485 interface with galvanic isolation is provided. The interface can be used for data transmission with peripheral equipment or other computers. A standard communication protocol has been implemented in the computer. For more information as well as the software-protocol description, please see manual for the RS 232 / 485-interface.

10.3.1 Hardware

The drawing below (fig. 13) provides an overview of the interface wiring. For both types, the connection is provided on the backside terminal strip.

Intervals for the data output can be programmed freely in-between 0…9999 minutes in the parameter level.

The RS 232-interface is mostly used for the communications with printers or for point to point connections over short distances.

The RS 485-interface is mostly used for communications on large distances (up to 1.2 km) or for multipoint connections.
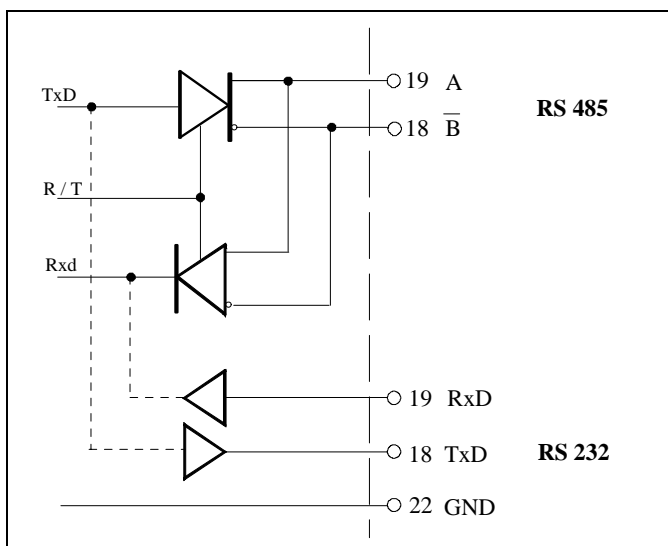

fig. 13: Circuit communicaiton interface

10.3.2 Communication Protocol

The **DigiFlow 505** has a built-in real time clock. This enables to print date and time on a ticket. Please note that the clock can run for about 5 days at a power brake down. After that the clock needs to be set again.

The used transmission parameters like Baud rate, parity…. Are software settings and to be entered while configuration. To achieve a communication, the user has to take care that the settings of the computer and the **DigiFlow 505** correspond with each other.

Communication can be done automatically, controlled by the real-time clock, or manually by the RESET-key.or by a request of the Host computer. In the first two cases the output is determined as shown in the next chapter. In case of communication with a Host computer only short ASCII–strings are generated as reply.

10.3.3 Printer-Protocol

Once the „End of Charge" signal appears a print-out is generated. After that, the internal counters are reset.

Print communication is done without any hardware-handshake. XON-XOFF sofware-handshake is considered. Take care that the printer buffer is large enough, to receive the whole print-out without any loss. A printout looks like the below example. (Printout language = Setup language)


```
DigiFlow515 V1.0      ID-Nr.: 01
Ausdruck:  66
Fre.,25.10.96    Zeit: 13:09:24

Summenwerte (Total)
 Masse :    35.36kg
 Volumen :   27.37Nm3

Durchflußwerte (Rate)
 Massenstrom :    540.10kg/h
 Volumenstrom :   417.98Nm3/h
 Tv :     10.00°C
 Pv :    121.30kPaa




DigiFlow515 V1.0      ID-Nr.: 01
Ausdruck:  67
Fre.,25.10.96    Zeit: 13:10:24
```

10.3.4 Host-Communication

To communicate with a Host-PC following commands are implemented, Except for first command, the unit must be activated.

IDXX   Activate Unit XX.
ID   The aktive Unit replies its ID-Code.
S?   Request for sum values
R?   Request for momentary values
SR   Reset totals

10.3.5 Network-Communication

For network communications several sets are connected with a twisted pair cable and mentioned about addresses. Up to 32 instruments can be connected to a common bus using the RS485 interface. Every set gets its own address about which it can be mentioned by the control computers, e.g. process control computers or PLC. The Host distributes an address and activates the corresponding set with it. The data interchange is controlled between control computer and instrument about the software protocol.
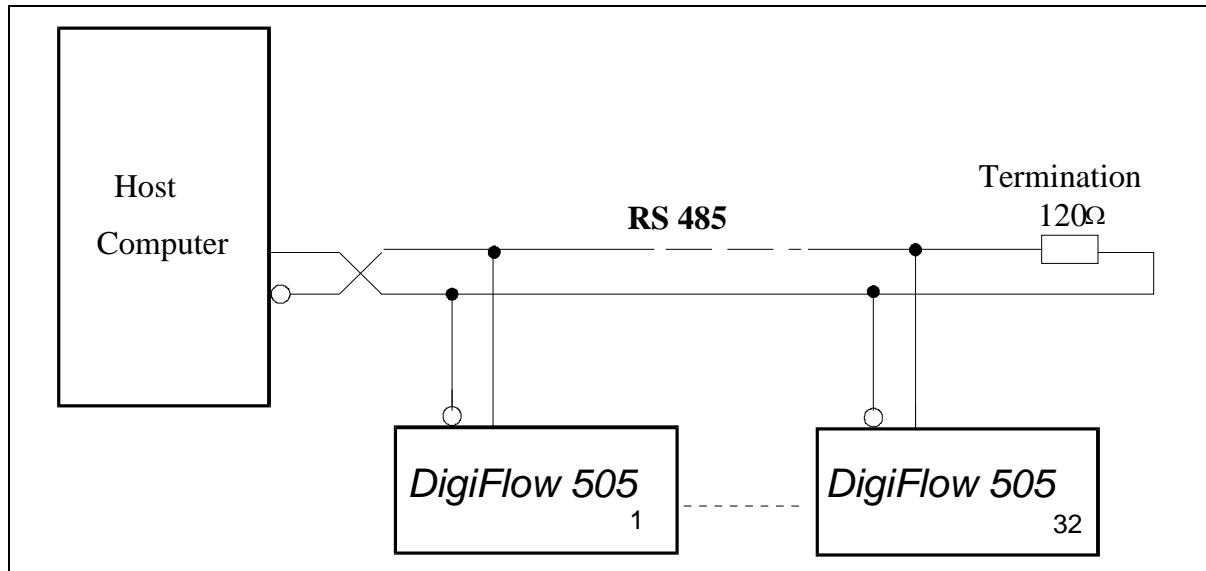

fig. 14 Circuits of a Nework

11 Options

11.1 Analogue Output

The 0/4-20mA output option provides an analog output of the default flow rate or one of the two RTD direct inputs. The output will be analog to the corrected volume, mass or energy, depending on which parameter is programmed as the default display, or the temperature of a selected RTD input.

All output signal are isolated from power source an signal inputs, to ensure minimum interference an high reliability.

A block diagram of the output circuit is represented below, the various methods of connection have to be found on the following sides.
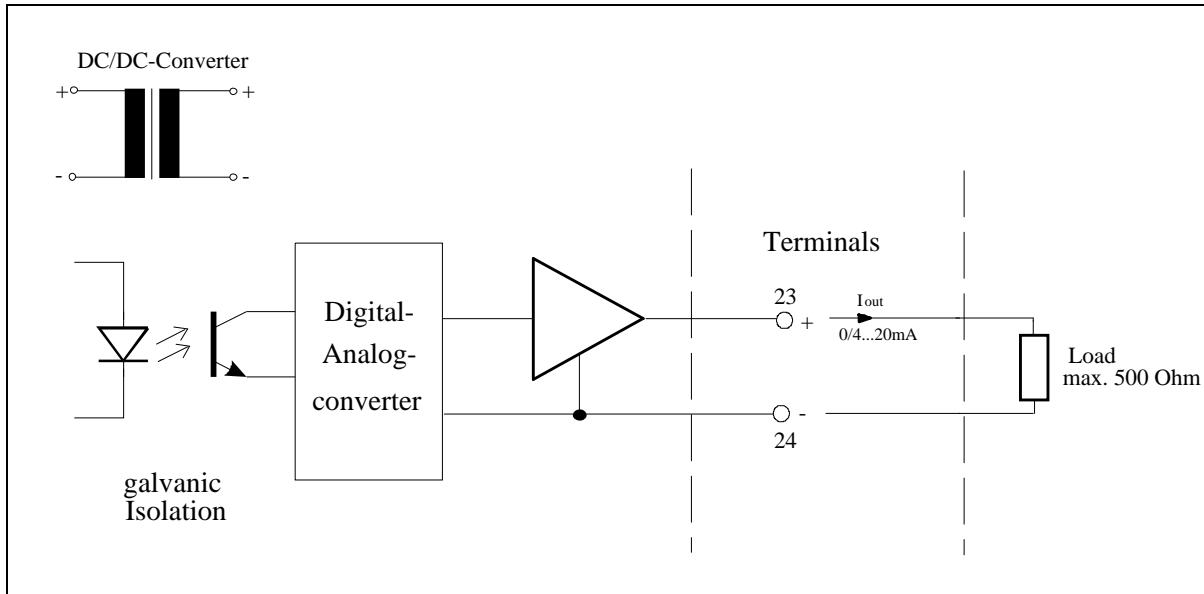

fig. 15: Circuit of analogue outputs

Maximum load in output loop is 500 Ω.

The parameters of the analogue output are to be programmed while configuration of the computer and help:

- defining the min. value, matching 4 mA or 0 mA.
- defining the max. value, matching 20 mA.
- chosing the signal range 0…20 mA or 4…20 mA

As the signal range can be chosen freely, the computer also can be used to amplify the input signal. Once a recorder is used, instead of the illustration of the complete measuring range (e.g. 0-200kg/min) an extended part of 100kg/min (4mA) up to 120kg/min (20mA) can be presented.

On flow rates or displayed values beyond the minimal and maximal values, a signal of 20 (resp. 0/4) mA will be put out.

The output signal will be actualized in accordance with the displayed value every 0,8 sec. Between these intervals the output value keeps being constant.

11.2 Sensor Purge Unit

Using this option, the **DigiFlow 505** controls the time regulation of the solenoid valves of a sensor purge unit. The sensor purge unit is designed to clean the sensing holes of an **Itabar**-Flow-Sensor from scaling which comes from a polluted fluid with compressed air. Mostly, the dp transmitter has to be uncoupled from the flow sensor for purging. This is done by solenoid valve blocks. During the cleaning process, the transmitter does not work and therefore, no flow signal is sent to the **Digiflow 505**. So the quantity determination would be falsified. Therefore, while purging, the flow signal is held at in the computer on the last recorded value before the cleaning process. The summation is roughly correct furthermore.

During the setting of the parameters 3 times have to be entered:

1.) Purging time distance t_a: Time between two purgings. Settable from 10 min to 31d:23h:50min. Diese Zeit beginnt bei „0" once the computer is started or after reconfiguration.
2.) Purging time t_s: Time of purging the sensor. Settable from 1s to 999s.
3.) Hold on time t_n: Time in which the measuring value is still held although the d.p. transmitter coupled again. This is done to let the sensor build up a steady differential pressure again. Settable from 0s to 99s.

11.2.1 Time Diagram Sensor Purge Unit
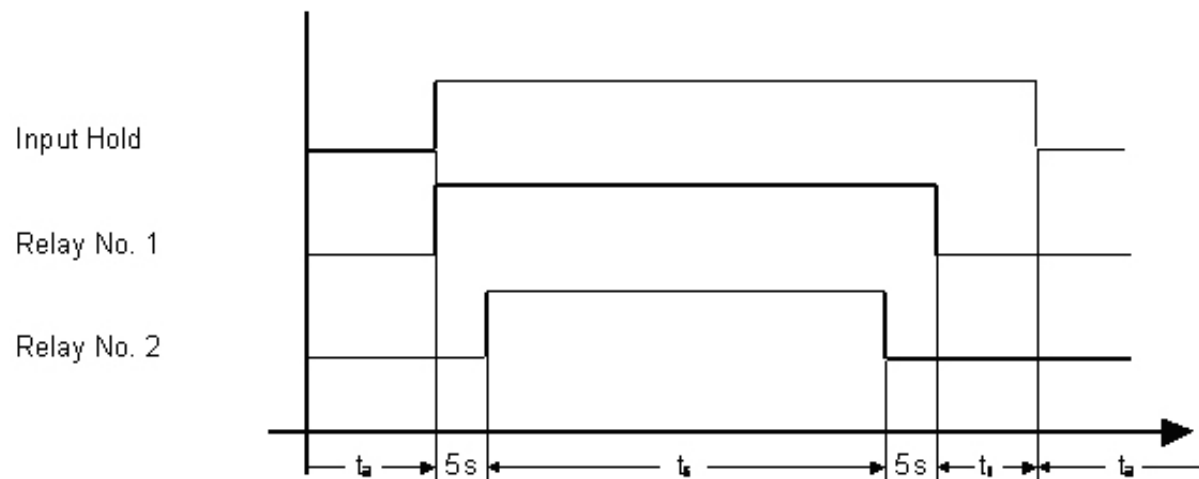
11.2.2 Functional Description

Once the time between purging t_a is elapsed, relay no. 1 is activated and the measured value of the flow input is held. After 5 s relay no. 2 is activated. Both relay keep activated throughout the purging process t_s. After elapse of the purging time relais no. 2 is deactived and after another 5 s relais no. 1 is deactivated, too. As long as the hold on time t_n takes, the measured value will be held. Finally, after this period has elapsed, too, the current flow signal will be computed again.

12 Installation

12.1 General

The standard version of the calculating machine is supplied as panel mounting set (144 X 77 mm 5.7" X 3.03"). The cutoff in this panel must be 137mm wide (5.4") and 67 mm (2.6") high. The depth is 130 mm (5.1").The set is fastened with the supplied mounting clamps.

The feeding of transmitter is carried out via a voltage supply output. This output delivers a voltage of about 18V, which can be set by a parameter at configuration. The maximum output current is 100mA.

The flow computer will be supplied by either 24V DC or 115/230V AC. The built-in mains transformer worries for a complete galvanic isolation between main power and the signal input- and output circles when powering at main.

If the transmitter is in larger distance installed by the flow computer, in each case shielded cables should for the inputs and outputs, also in regard on EMC strength be used.
Make sure that the shielding may be grounded only at an end.

Noise filters:
If inductive loads are switched with the relay output, it may be necessary to provide a filtering module under circumstances

12.2 Back View
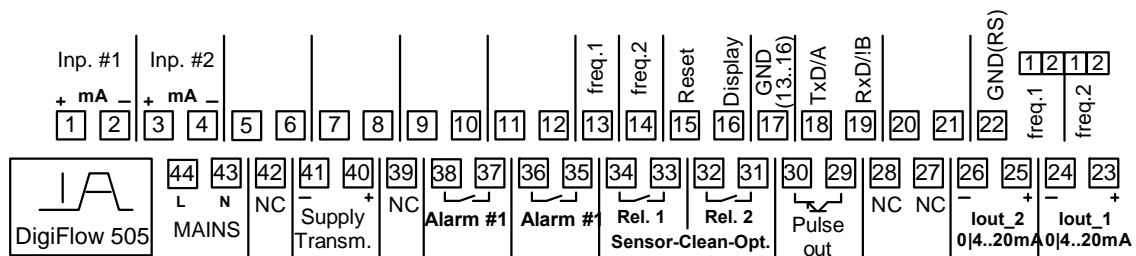
12.3 Terminal Description

Klemme	Funktion
1	Flow input no. 1, positive Pole
2	Flow input no. 1, negative Pole
3	Flow input no. 2, positive Pole
4	Flow input no. 2, negative Pole
5	Not used, please do not connect!
6	
7	
8	
9	
10	
11	
12	
13	Frequency input no. 1, positive Pole
14	Frequency input no. 2, positive Pole
15	External Start, positive Pole
16	External Stop, positive Pole
17	GND for clamps 13 - 16
18	RS 232 TxD / RS 485 A
19	RS 232 RxD / RS 486 B
20	Supply Pt100, positive Pole
21	Supply Pt100, negative Pole
22	GND RS 232 / RS 485
23	Not used. Please do not connect!
24	
25	
26	
27	free
28	free
29	Pulse output (NPN-collektor)
30	Pulse output (NPN-emitter)
31	Relays flush no. 2 (option)
32	Relays flush no. 2 (option)
33	Relays flush no. 1 (option)
34	Relays flush no. 1 (option)
35	Relays alarm #1
36	Relays alarm #1
37	Relays alarm #2
38	Relays alarm #2
39	free
40	Transmitter supply +18V, positive Pole
41	Transmitter supply +18V, negative Pole
42	free
43	Mains N / (optionally 24V negative Pole)
44	Mains L / (optionally 24V positive Pole)

13 Block diagram
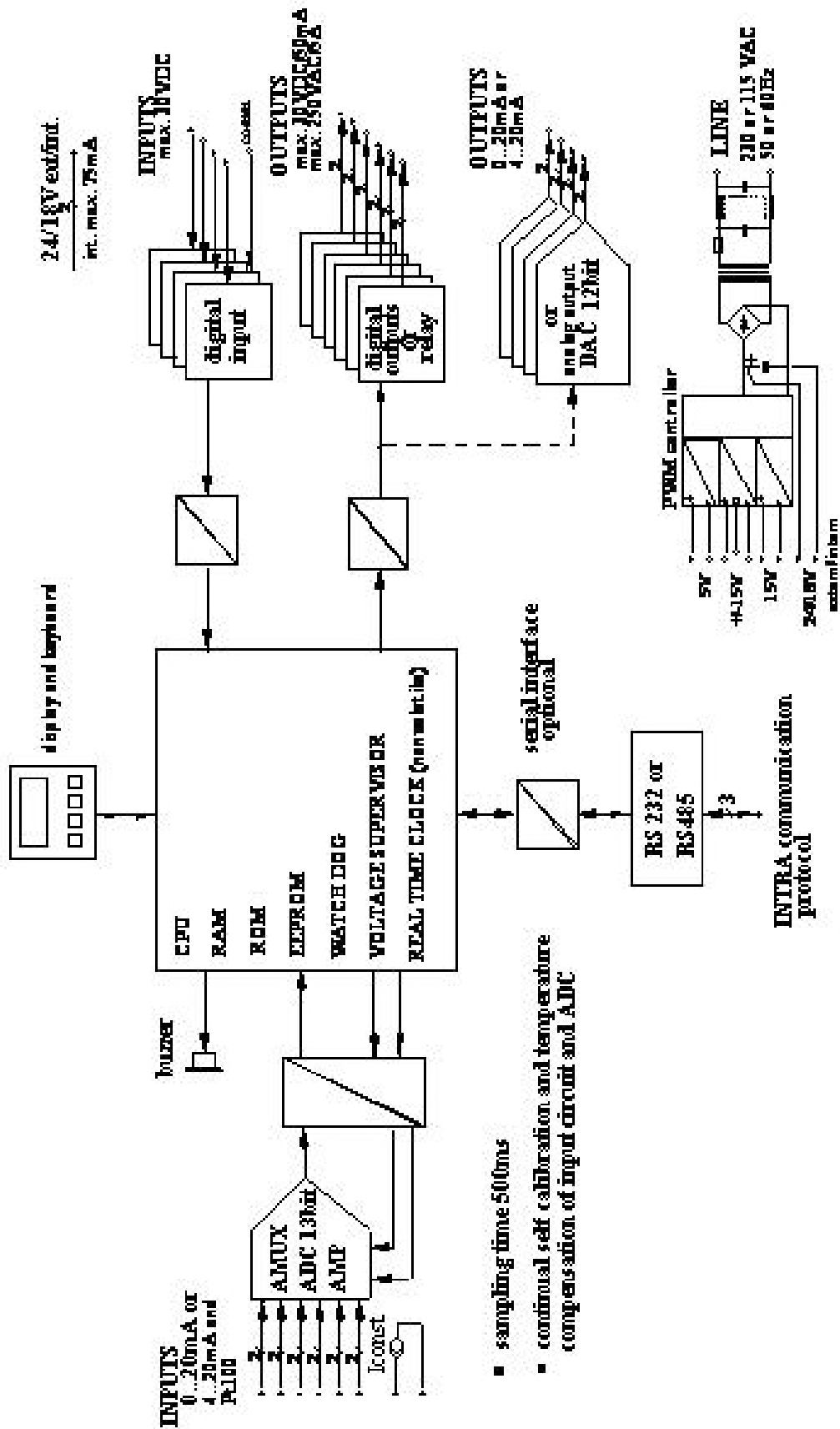
14 Appendix A: Error Descriptions

In case of errors the display of the DigiFlow 505 toggles between normal display and error display in Frequency of 1 s. The beeper sounds alternately.

The beeper can be stopped by pressing the ENTER-key during on change to error display. The beeper is then quiet until a new error condition occures.

All errors are not stored and releases when the error conditions ends.

The meaning of these errors are:

Analog #1	Iin < 3.6mA or Iin > 22mA.
Analog #2	Same as Analog #1, but only when this input is used.
Analog #3	Same as Analog #1, but only when this input is used.
Analog #4	Same as Analog #1, but only when this input is used.

ROOM FOR YOUR NOTES

Besides the products covered by this brochure, Intra-Automation GmbH also manufactures other high-quality and high precision instruments for industrial measurement tasks. For more information, please contact us (contact details on the backside of this brochure).

Flow measurement

Itabar®-Flow Sensor

IntraSonic IS210 Ultrasonic Flow Meter

Level measurement

ITA-mag. Level Gauge

MAGLINK Level Indicator

Other Measurement Tasks:

DigiFlow Flow and Level Computers

IntraCon Digital Controllers

IntraDigit Digital Indicators / Meters

International Headquarters:

Intra-Automation GmbH
Otto-Hahn-Str. 20
41515 Grevenbroich
GERMANY

☎ +49 – (0) 21 81 / 7 56 65-0
🖷 +49 – (0) 21 81 / 6 44 92

🖰 info@intra-automation.de

Sales Office for the BENELUX:

B.V. Intra-Automation HTP
PO Box 10
4731 AA Oudenbosch
THE NETHERLANDS

☎ +31 – (0)165 – 32 22 01
🖷 +31 – (0)165 – 32 29 70

🖰 info@intra-automation.nl

🖳 www.intra-automation.com