meterQ

Climate Protection through Technology– We Help You Achieve Sustainability

Prime Partner
in Hydrogen
and Gas Analytics

Climate Protection through Technology – We Help You Achieve Sustainability

Acting sustainably means taking future generations
into account when consuming raw materials and other treasures of the earth.

In our industry, where everything still revolves around natural gas, the issue of sustainability cannot be emphasized enough. Natural gas is a fossil raw material, and supplies are limited. The current crisis makes this clear to us more than ever.

We at **meterQ** have therefore dedicated ourselves to this topic and can help you to become more sustainable with our services and our products. In doing so, you will be conserving the resource natural gas, the climate, the environment and ultimately helping to secure our and our children's future.

The most important buzzword in this context certainly is hydrogen. How hydrogen can supplement natural gas and perhaps replace it completely in the future is a controversial issue. **meterQ** is at the forefront of research and development in this area.

Newly developed: **MGC**direct

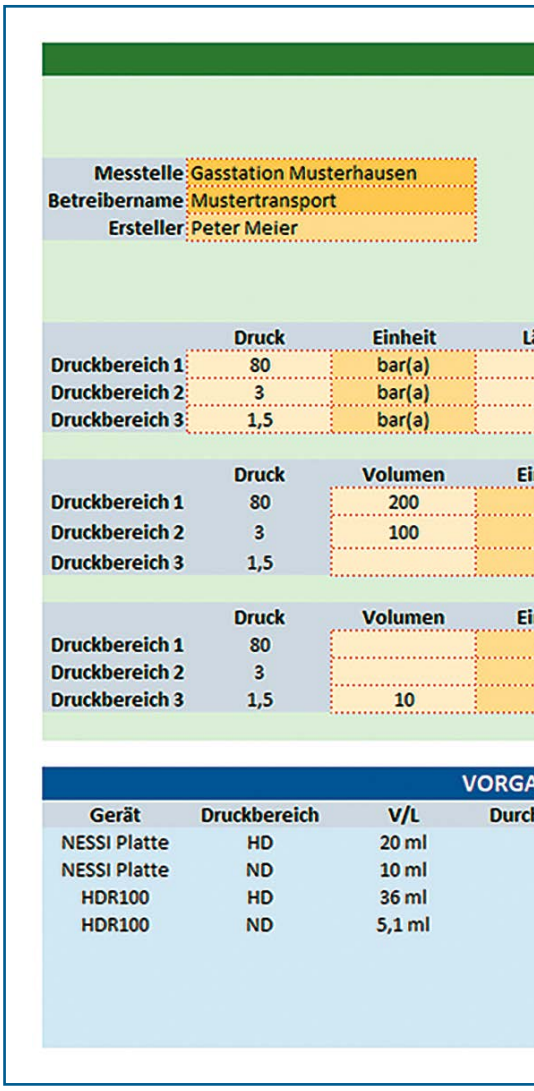
Reduction of Bypass Flows and Emissions

The fact that we can and must become more sustainable with natural gas is obvious. Us equipment manufacturers have been asked by customers for the last 10 years what can be done to reduce bypass flows or to recycle the gas that flows through the bypasses instead of blowing it into the atmosphere.

To elaborate, gas analyzers are usually installed a few meters away from sampling point at the pipeline. Since each analyzer consumes a fixed amount of gas per analysis, only as much gas (volume) can flow from the line to the analyzer as the analyzer consumes. This results in a fixed velocity and therefore time for the sample to reach the analyzer. The measurement delay or dead time that elapses between taking the sample and sending the result is the sum of the analysis time and the transport time.

If You want to reduce the dead time, the only option with a fixed analysis duration is to reduce the transport time. To do this, a bypass is installed which increases the flow rate by allowing additional gas to flow past the analyzer. This gas is vented into the atmosphere.

How much gas is blown off into the atmosphere depends on the one hand on the dead time to be achieved and on the other hand on the physical conditions such as line pressure and distance to the analyzer. In practice, more than 10 times as much gas is usually emitted via bypass than the analyzer itself consumes for the measurement. Returning the gas to the line is not economical since it is reduced to atmospheric pressure at the bypass. Every bypass not only wastes an enormous amount of gas, but also harms the environment, since natural gas is 25 times as harmful to the climate (greenhouse effect) than carbon dioxide.



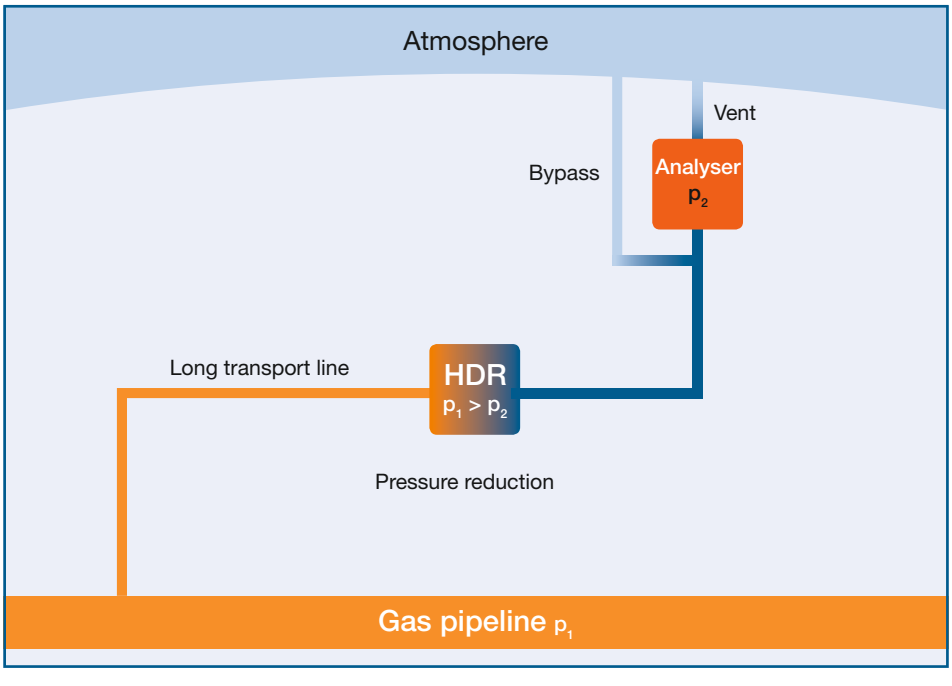
Messtelle	Gasstation Musterhausen
Betreibername	Mustertransport
Ersteller	Peter Meier

	Druck	Einheit
Druckbereich 1	80	bar(a)
Druckbereich 2	3	bar(a)
Druckbereich 3	1,5	bar(a)

	Druck	Volumen
Druckbereich 1	80	200
Druckbereich 2	3	100
Druckbereich 3	1,5	

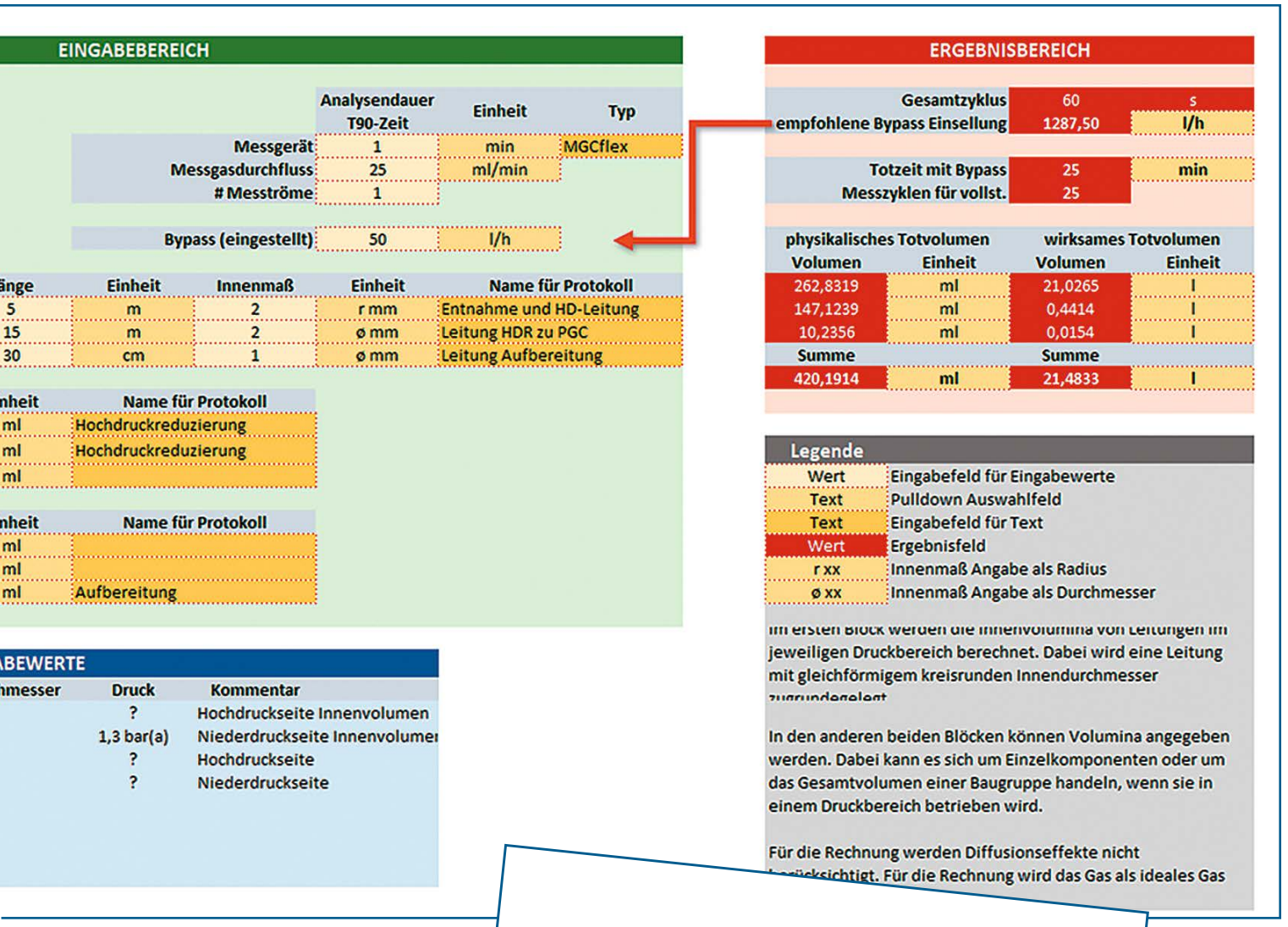
	Druck	Volumen
Druckbereich 1	80	
Druckbereich 2	3	
Druckbereich 3	1,5	10

Gerät	Druckbereich	V/L
NESSI Platte	HD	20 ml
NESSI Platte	ND	10 ml
HDR100	HD	36 ml
HDR100	ND	5,1 ml



The first thing to do is to analyse the existing installation, calculate dead time and dead volume and adjust the bypass in such a way that it produces as few emissions as possible and at the same time fulfilling the metrological (custody transfer!) requirements.

For new plants, the same should already be considered at the planning stage and optimally designed accordingly. For this purpose, **meterQ** has developed a tool that makes it possible to calculate dead volume, dead time and the required dead time and the required bypass and information in a one-page protocol. Particularly in the case of existing systems, it usually turns out that there is no optimal configuration. Both the emission of natural gas through the bypass and a significant measurement delay are practically unavoidable.



EINGABEBEREICH

	Analysendauer T90-Zeit	Einheit	Typ
Messgerät	1	min	MGCflex
Messgasdurchfluss	25	ml/min	
# Messströme	1		
Bypass (eingestellt)	50	l/h	

änge	Einheit	Innenmaß	Einheit	Name für Protokoll
5	m	2	r mm	Entnahme und HD-Leitung
15	m	2	ø mm	Leitung HDR zu PGC
30	cm	1	ø mm	Leitung Aufbereitung

nheit	Name für Protokoll
ml	Hochdruckreduzierung
ml	Hochdruckreduzierung
ml	

nheit	Name für Protokoll
ml	
ml	
ml	Aufbereitung

ABEWERTE

nmesser	Druck	Kommentar
	?	Hochdruckseite Innenvolumen
	1,3 bar(a)	Niederdruckseite Innenvolume
	?	Hochdruckseite
	?	Niederdruckseite

ERGEBNISBEREICH

Gesamtzyklus	60	s
empfohlene Bypass Einsellung	1287,50	l/h
Totzeit mit Bypass	25	min
Messzyklen für vollst.	25	

physikalisches Totvolumen		wirksames Totvolumen	
Volumen	Einheit	Volumen	Einheit
262,8319	ml	21,0265	l
147,1239	ml	0,4414	l
10,2356	ml	0,0154	l
Summe		Summe	
420,1914	ml	21,4833	l

Legende

Wert	Eingabefeld für Eingabewerte
Text	Pulldown Auswahlfeld
Text	Eingabefeld für Text
Wert	Ergebnisfeld
r xx	Innenmaß Angabe als Radius
ø xx	Innenmaß Angabe als Durchmesser

Im ersten Block werden die Innenvolumina von Leitungen im jeweiligen Druckbereich berechnet. Dabei wird eine Leitung mit gleichförmigem kreisrunden Innendurchmesser zugrundegelegt.

In den anderen beiden Blöcken können Volumina angegeben werden. Dabei kann es sich um Einzelkomponenten oder um das Gesamtvolumen einer Baugruppe handeln, wenn sie in einem Druckbereich betrieben wird.

Für die Rechnung werden Diffusionseffekte nicht berücksichtigt. Für die Rechnung wird das Gas als ideales Gas

At this point **meterQ** can help you reduce these bypass emissions or even avoid them completely without accepting negative effects on dead time: instead of using a conventional PGC, use our **MGC**^{direct}, which is installed directly on the pipeline with its special sampling probe, offering by far the shortest dead time of all custody transfer solutions with no bypass emission at all.

A double benefit: fastest response time completely without bypass emissions.

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Meter-Q Solutions GmbH

Totvolumenberechnung und Bypassauslegung

Betreiber: Mustertransport
Messstelle: Gasstation Musterhausen

In der Messstelle Gasstation Musterhausen wird ein MGC^{flex} betrieben.
Die Analysendauer beträgt 1min.

Für die Berechnung wurde ein Messgasverbrauch des MGC^{flex} von 25ml/min zugrundegelegt und berücksichtigt.

Für die Berechnung wurden die folgenden Beiträge berücksichtigt:

Druck 1
Entnahme und HD-Leitung bei 80 bar(a): Länge 5m Durchmesser 4mm
Hochdruckreduzierung bei 80 bar(a): Volumen 200ml

Druck 2
Leitung HDR zu PGC bei 3 bar(a): Länge 15m Durchmesser 2mm
Hochdruckreduzierung bei 3 bar(a): Volumen 100ml

Druck 3
Leitung Aufbereitung bei 1,5 bar(a): Länge 30cm Durchmesser 1mm
Aufbereitung bei 1,5 bar(a): Volumen 10ml

Die Berechnung ergibt ein physikalisches Totvolumen von 420,2ml, was unter Berücksichtigung des Drucks einem wirksamen Totvolumen von 21,5l entspricht.

Der Bypass muss auf 1287,5l/h eingestellt werden, um das vorhandene Totvolumen innerhalb einer Messperiode einmal vollständig auszutauschen. Mit der gewählten Bypasseinstellung von 50l/h wird das vorhandene Totvolumen innerhalb von 25min einmal vollständig ausgetauscht. Ein vollständiger Austausch benötigt etwa 25 Messzyklen.

Pro Kalenderjahr emittiert das Messgerät Erdgas im Wert von 44€ und der Bypass Erdgas im Wert von 1459€. Nach dem BEHG entstehen im Jahr 2023 zusätzliche Kosten auf Grund der Treibausgasemission von 0€ durch das Messgerät und von 0€ durch den Bypass. Die Emissionsgebühren für die nächsten 3 Jahre betragen 68€ durch das Messgerät und 2250€ durch den Bypass. Es ergeben sich daraus für den Betriebszeitraum 2023 bis 2025 Gesamtkosten von 8327€ aus Energieverlust und Emissionsabgaben.*

*Für die Berechnung der Kosten wurden folgende Werte zugrunde gelegt: Erdgas entspricht Methan mit Brennwert 11,1kWh/m³, Energiepreis 0,3€ pro kWh, Emmissionsfaktor 25 der EU für Methan, Kosten pro Tonne Kohlendioxid bis 2025 nach BEHG (Brennstoffemissionshandelsgesetz).

Bericht erstellt am 21.02.2023 von Peter Meier

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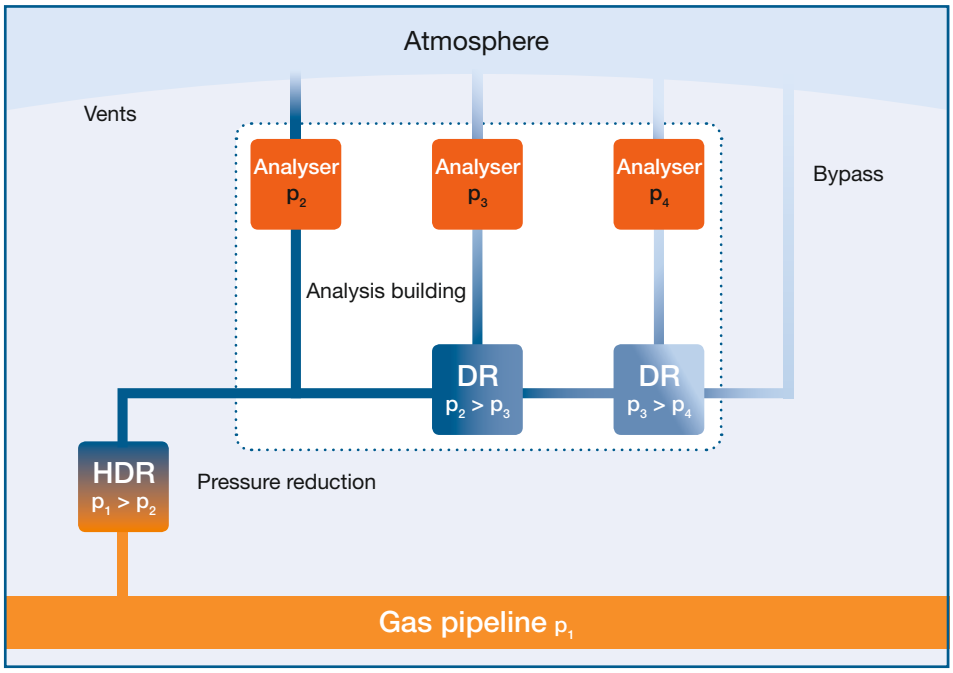
Analysis and Optimization of the Overall Installation

The third measure, which is always possible, and which does not require special hardware, is analysis and optimization of the overall installation. You can make use of the fact that usually not only one but several gas analyzers (besides custody transfer measurement, oxygen sensor, sulfur measurement, dew point, …) are operated in one installation.

Here, it makes sense to use a common supply line and to arrange the devices sensibly according to the working pressure. This way, analyzer flow rates add up and only a single bypass is needed, if at all, which is much smaller than if each device has to be supplied individually.



We would be happy to evaluate your optimization potential and carry out the conversion at your request.

Furthermore, there are the little things that contribute to sustainability and that we consistently take into account in products and projects. We optimize our installations to save energy and materials where possible.

For example, we will always try to transmit signals digitally over one data line, rather than over many contact lines. We use components and build our equipment to run as energy-efficiently as possible, to be low-maintenance, and to contain as few wear parts as possible.

We build modularly and with recyclable materials so that an existing installation can be easily expanded, adapted or even recycled.

And Our Own Sustainability

Of course, when it comes to sustainability, we don't just look outward, but also improve our internal processes with the aim of becoming at least climate neutral. In other words, we as a company would like to achieve a positive environmental balance and be able to offer you our services without harming the environment and the climate.

We want to minimize our own CO_2-footprint, we want to reduce our energy consumption, we want to work more efficiently, we want to live environmental awareness.

UMWELTMANAGEMENT
ISO 14001

Therefore, a few months ago we introduced an environmental management system according to ISO 14001, which allows us to evaluate all our processes and optimize them according to environmental aspects. We have decided to first practice the system for one year before we get certified according to ISO 14001 next year.

As an expanding company, we have limited resources but one big advantage: we are very flexible and agile. Sustainability is important to all of us and together we achieve and live it.

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Meter-Q Solutions GmbH
Robert-Bosch-Straße 10
D-35510 Butzbach

Mobil +49 (0) 151 7010 7397
Tel. +49 (0) 6033 92452-20
E-Mail: info@meterQ.de
www.meterq.de