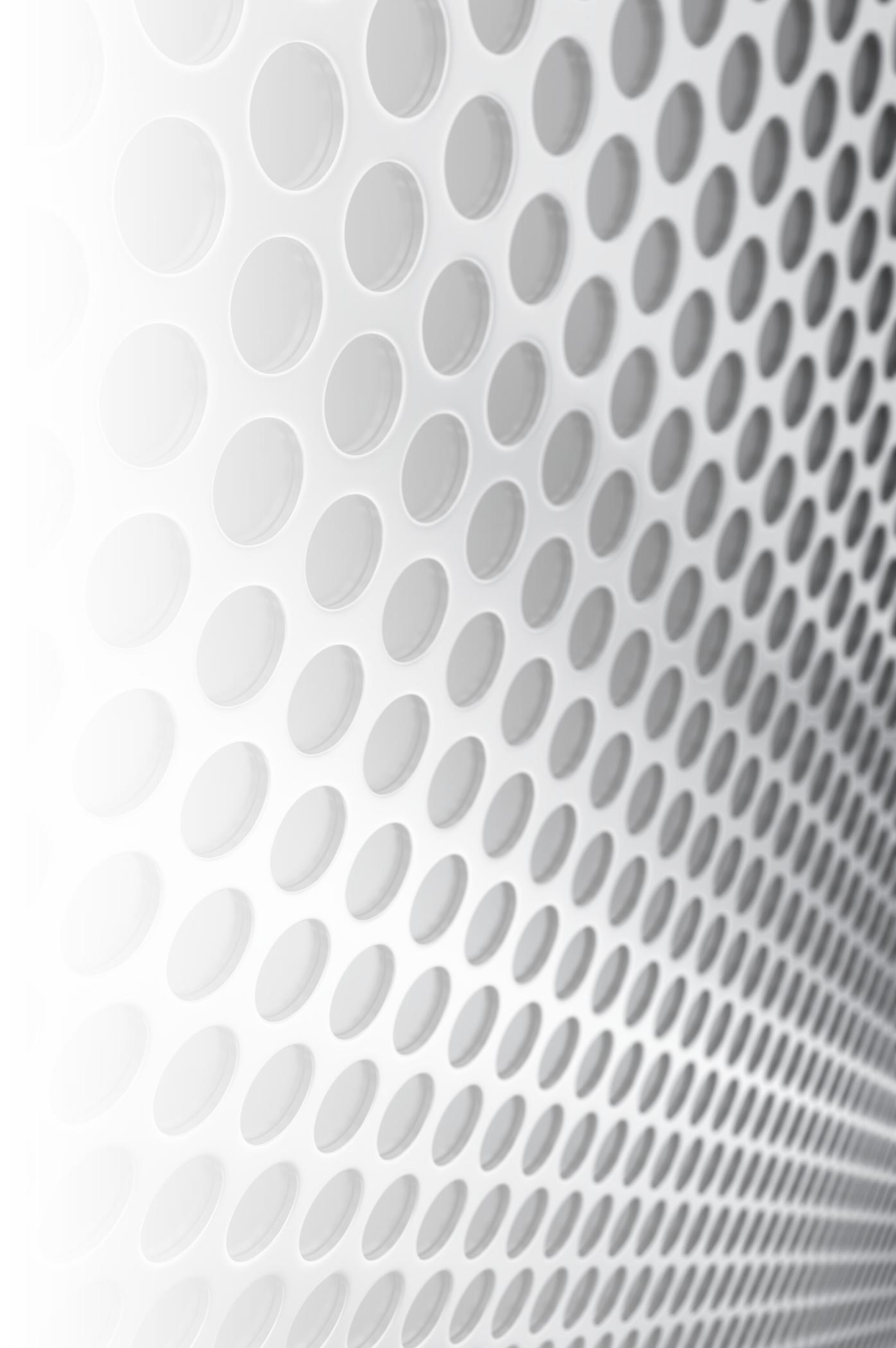


Section 1:

# DIAGNOSTIC PRODUCTS



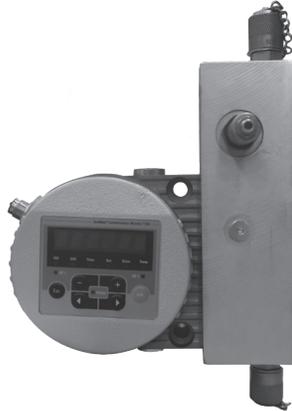
# CS 1000 Contamination Sensor

Formerly Known as "TCM - TestMate Series"



- Usable with FluMoS Mobile App when connected to the CSI-C-11

**CSI-C-11  
Compatible  
Product**



Includes: Unit, FluMoS Software, Operation Manual and Calibration Certificate



## Features and Benefits

- Measures Particles in Four Sizes: >4, >6, >14 and >21 microns
- In-line or Manifold Mounting
- ISO or SAE codes can be output in 4-20 mA analog signal
- Compatible with Standard Mineral Fluids & Phosphate Esters
- Display and Keypad can be rotated (up to 270°)
- Inlet and Outlet Ports are Interchangeable (bidirectional) (without manifold only)
- Recommended recalibration: Only every 2 years

## Description

The Contamination Sensor 1000 (CS 1000) continuously measures solid contamination in hydraulic fluid. Enclosed in a 4-inch diameter case, the CS 1000 utilizes an optical sensor and measures particles in four sizes: >4, >6, >14 and >21 microns. Measurement results can be output as a contamination code according to ISO 4406:1999 or SAE AS 4059(D).

The CS 1000 is designed for connection to hydraulic and lubrication lines with pressures up to 5075 psi (350 bar) and viscosities up to 4635 SUS (1000 cSt). The unit requires that a small flow of oil (between 30 mL/min and 500 mL/min) is diverted for measurement purposes.

The CS 1000 provides the user with a smaller, tougher, and more versatile stationary sensor. It provides instantaneous readings and is able to self-diagnose continuously with error indication via the status LED. The attractive cost-to-performance ratio makes it especially applicable for OEM applications. Online, real-time condition monitoring allows you to have total predictive maintenance.

## Specifications

<b>Measuring Range:</b>	Display ISO ranges between 9/8/7 and 25/24/23 Calibration within the range ISO 13/11/10 to 23/21/18
<b>Contamination Output Code:</b>	<b>Standard:</b> ISO 4406:1999 or SAE AS 4059(D) <b>Optional:</b> ISO 4406:1987; NAS 1638 and ISO 4406:1999; SAE AS 4059(D)
<b>Self-Diagnosis:</b>	Continuously with error indication via status LED
<b>Inlet/Outlet:</b>	5075 psi (350 bar) max
<b>Connections:</b>	Inlet: ISO 228 G1/4 Threaded    Outlet: ISO 228 G1/4 Threaded
<b>Sensor Flow Rate:</b>	30 to 500 mL/min
<b>Permissible Viscosity Range:</b>	32 to 4635 SUS (1 to 1,000 cSt)
<b>Fluid Temperature Range:</b>	32°F to 185°F (0°C to +85°C)
<b>Power Supply Voltage:</b>	9 to 36 VDC residual ripple <10%
<b>Accuracy:</b>	+/- 1/2 ISO class in the calibrated range
<b>Power Consumption:</b>	3 Watt max
<b>Electrical Outputs:</b>	4 to 20mA Analog; 2 to 10 V Analog (option) RS485
<b>Electrical Specifications:</b>	4 to 20 mA Analog output (max burden 330Ω); 2 to 10 V output (min. load resistor 820Ω) Limit switching output (Power MOSFET): max current 1.5A
<b>Ambient Temperature Range:</b>	-22°F to 176°F (-30°C to +80°C)
<b>Storage Temperature Range:</b>	-40°F to 176°F (-40°C to +80°C)
<b>Relative Humidity:</b>	95%, non-condensing max
<b>Seal Material:</b>	Mineral Oil: Viton®    Phosphate Ester: EPR
<b>Electrical Safety Class:</b>	III (low voltage protection)
<b>IP Class:</b>	IP67
<b>Weight:</b>	2.9 lbs (1.3 kg)
<b>Mounting Position:</b>	Recommended vertical installation with direction of flow south to north through CS 1000 or manifold block

### NOTES:

All Models feature an analog electrical output. Additionally, an electrical switching output can be configured to alert the operator about rising falling contamination level.

Viton® is registered trademark of DuPont Dow Elastomers.

# Contamination Sensor

# CS 1000

CS 1000

Formerly Known as "TCM - TestMate Series"

CS 1939

CSI-C-11

HY-TRAX®

RBSA

CSM

TFL

TFH

FCU

MCS

AS

SMU

CTU

EPK

Trouble

Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSA

HFS-BC

HFS-15

MFD-BC

MFS, MFD

HY-TRAX®

Retrofit System

MFD-MV

MFS-HV

AMS, AMD

FS

AMFS

KLS, KLD

MCO

AKS, AKD

LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

SVD

OXs

Appendix

## Features

- Enables the user to transfer data from CS 1000 to PC
- Enables user to change CS 1000 settings
- Enables user to have real time monitoring & data storage



**Communication Kit**  
Description:  
CSI-D-5  
7632013

## What's Included

Converter box, 115 VAC to 24 VDC adapter, USB driver, FluMoS software, communication & power cables, case

## Features

- For WLAN or LAN transmission of data.
- Addition of data stage capabilities.



**CSI-C-11 Sensor Interface Module**  
P/N 4066011

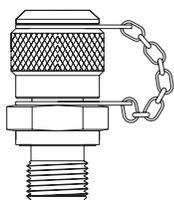
Communication cable and power adapter can be ordered individually.



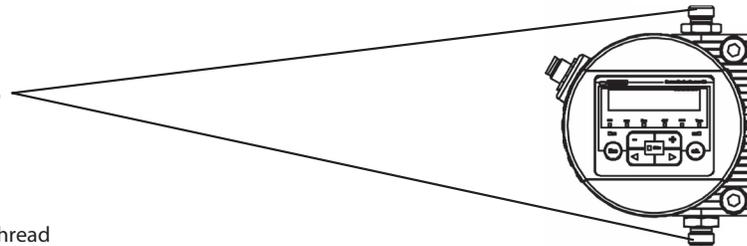
**Description: Power Adaptor (PS5)**  
P/N 7600801

G Thread	Sealing System	Description	Part Number
1/4" BSPP	WD Seal Viton	SP1620G14WDM	7622704

1620 Thread



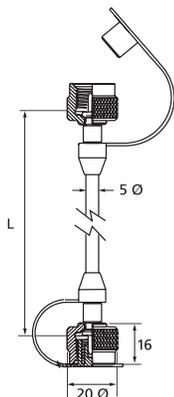
ISO 228 G 1/4 Thread



## Schroeder Check

TestPoint Options for CS 1000

NOTES:  
In-line version of CS.  
In-line version cannot be mounted on manifolds



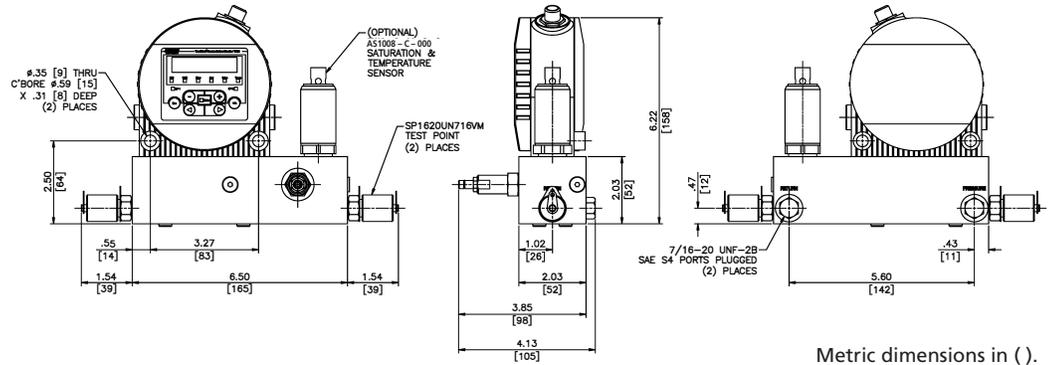
Length inches (mm)	ΔP (max) psi (bar)	Description	Part Number
6 (152)	6,500 (450)	SM4-1620-006	7612174
35 (889)	6,500 (450)	SM4-1620-035	7612175

**Microflex Hose**  
Options for CS 1000

# CS 1000

# Contamination Sensor

CS with  
Optional CS  
Block Kit



Metric dimensions in ( ).

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder CS 1000:

BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6	BOX 7	BOX 8	BOX 9	BOX 10	BOX 11
CS										

**Example:** NOTE: One option per box

BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6	BOX 7	BOX 8	BOX 9	BOX 10	BOX 11
CS	1	2	2	0	A	0	0	0	0	000

= CS1220-A-0-0-0-0 /-000

BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6	BOX 7	BOX 8	BOX 9	BOX 10	BOX 11
<b>Indicator Code</b>	<b>Resolution</b>	<b>Indicator Code</b>	<b>Options</b>	<b>Fluids</b>	<b>Analog Interfaces</b>	<b>Switching Output</b>	<b>Digital Interfaces</b>	<b>Electrical Connection</b>	<b>Mounting</b>	<b>Modification Number</b>
CS = Contamination Sensor	1 = 4 Particle Size Channels	2 = ISO 4406:1990 or SAE AS 4059(D) > 4 μm(c) > 6 μm(c) > 14 μm(c) > 21 μm(c) 3 = ISO 4406:1987 NAS 1638 > 2 μm > 5 μm > 15 μm > 25 μm ISO 4406:1999 SAE AS 4059(D) > 4 μm(c) > 6 μm(c) > 14 μm(c) > 21 μm(c)	1 = without Display 2 = with Display	0 = Hydraulic/Mineral 1 = Phosphate Esters	A = 4 to 20 mA B = 2 to 10 V	0 = Limit Switching Output	0 = RS485	0 = Plug M12x1, 8 Pole (Connection Cable Not Included)	0 = Inline Version 1 = Flanged Version	000 = Standard K = CS Block Kit without AS Sensor KAS = CS Block Kit with A1000 Sensor KASD = CS Block Kit with AS3008 Sensor

### NOTE:

#### CS 1000 Block Kit

Includes: CS and AS Sensor Connection Cables, 2 Test Points, 2 Microflex hoses, FluMoS Light Software  
The Contamination Sensor Block KIT (CS 1000 Block KIT) combines two condition monitoring products, the CS 1000 series (Contamination Sensor) into one plug and play unit. It serves as an on-line measurement of solid contamination and water in hydraulic and lube systems.

Note: Flow control is necessary when utilizing the CS 1000 sensor. Flow must be maintained through the sensor module to ensure accurate readings. Utilization of the CS Block KIT is required to maintain Sensor flow rate range as described in the Technical Specifications (at the left).

# Contamination Sensor

# CS 1939

CS 1000

CS 1939



## Features and Benefits

- Critical machine conditions are identified in early stages
- Continuous monitoring of oil conditions
- Condition-based maintenance planning

## Market Applications

- Industrial hydraulic and lubrication systems
- Mobile hydraulics

- Compatible with:



The Contamination Sensor CS 1939 is an online fluid sensor for permanent monitoring of particle contamination in fluids.

The cleanliness results are presented according to ISO/SAE classifications.

This instrument combines the latest materials and technologies with proven engineering and provides the user with a compact and robust stationary sensor.

The attractive price/performance ratio makes it particularly advantageous for OEM applications for Condition Monitoring.

## Description

## Specifications

<b>Self-diagnosis:</b>	Continuous with error display via status LED
<b>Measured variables:</b>	ISO 4406 SAE AS 4059
<b>Service parameters:</b>	Flow (status) Drive (%) Temp (°F) and (°C)
<b>Installation position:</b>	Recommended: vertical direction flow
<b>Ambient temperature:</b>	-22°F to 176°F (-30°C to 80°C)
<b>Storage temperature range:</b>	-40°F to 176°F (-40°C to 80°C)
<b>Relative humidity:</b>	max. 95%, non-condensing
<b>Seal Material:</b>	FPM for CS1939-0 / EPDM for CS1939-1
<b>Protection class:</b>	III (safety extra-low voltage)
<b>Weight:</b>	2.9 lb (1.3 kg)
<b>Measuring range:</b>	Sensor measures from Class ISO 9/8/7 (MIN) to Class ISO 25/24/23 (MAX) Calibrated in the range ISO 13/11/10 to 23/21/18
<b>Accuracy:</b>	+/-½ ISO class in the calibrated range
<b>Operating pressure:</b>	max. 5075 psi / 350 bar
<b>Hydraulic connection:</b>	Inline or hose connection (A,B): thread G1/4, ISO 228 or flange connection (C,D): DN 4
<b>Permitted measurement flow rate:</b>	30 to 500 mL/min
<b>Permitted viscosity range:</b>	32 to 4635 SUS (1 to 1000 cSt)
<b>Fluid temperature range:</b>	32°F to 185°F (32°C to 85°C)
<b>Connection, male:</b>	M12x1, 5-pole, to DIN VDE 0627 or IEC61984
<b>Supply voltage:</b>	9 to 36 VDC, residual ripple < 10%
<b>Power consumption:</b>	3 watts max.
<b>CAN interface:</b>	2-wire, half duplex SAE CAN J1939 protocol
<b>HSI (Sensor Interface):</b>	1 wire, half duplex

CSI-C-11

HY-TRAX®

RBSA

CSM

TFL

TFH

FCU

MCS

AS

SMU

CTU

EPK

Trouble  
Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSA

HFS-BC

HFS-15

MFD-BC

MFS, MFD

HY-TRAX®  
Retrofit System

MFD-MV

MFS-HV

AMS, AMD

FS

AMFS

KLS, KLD

MCO

AKS, AKD

LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

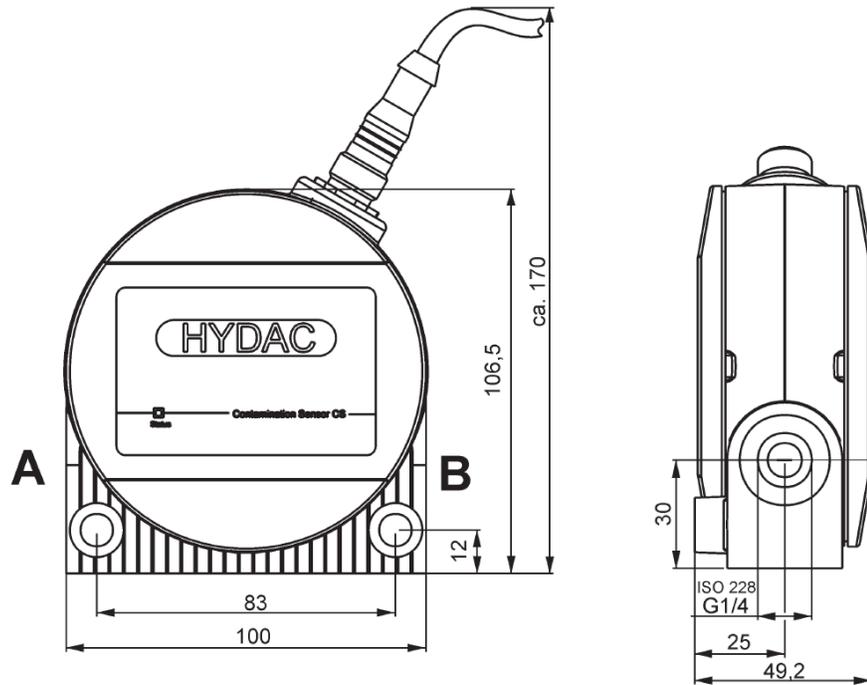
SVD

OXS

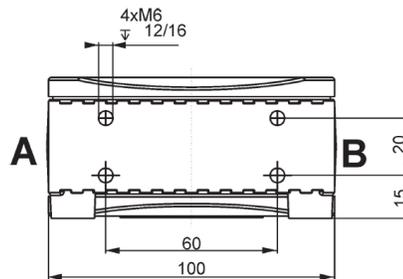
Appendix

## Dimensions

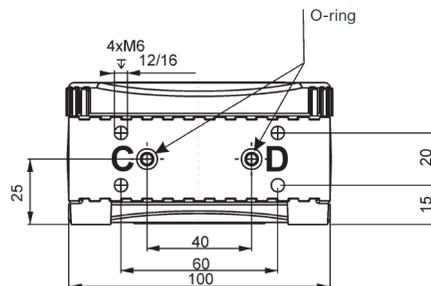
CS 1939 without display



Bottom view  
Pipe or hose connection



Flange connection



Metric dimensions in ( ).

# Contamination Sensor

# CS 1939

CS 1000

CS 1939

CSI-C-11

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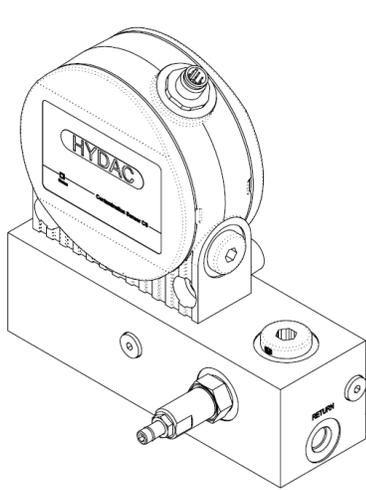
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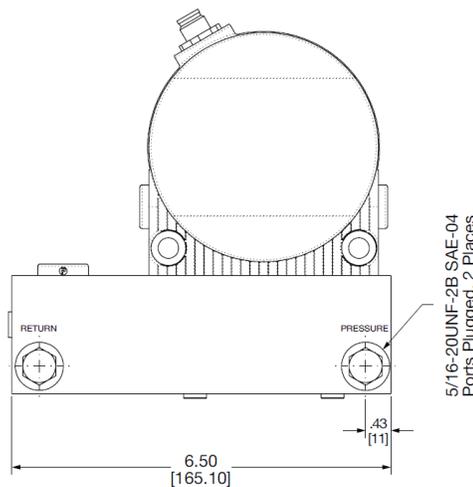
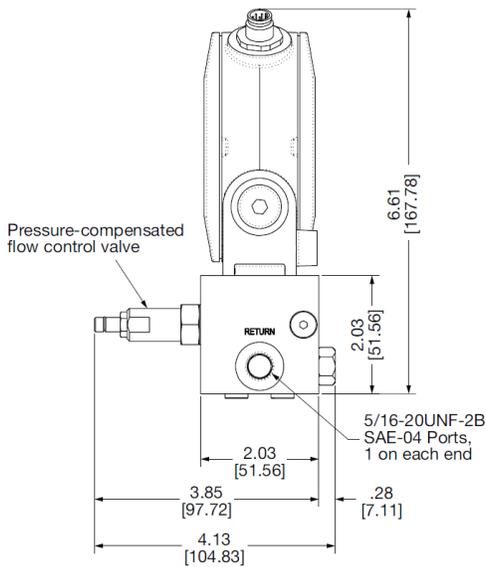
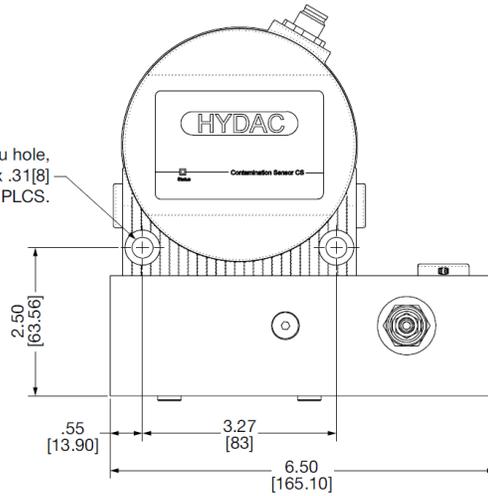
Appendix

CS 1939 with Block Kit (Requires minimum flow of 0.3 L/min., and minimum pressure of 6 bar)

## Dimensions (cont.)



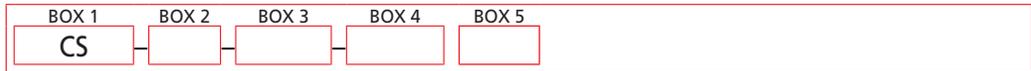
Ø .35[9] thru hole,  
C'Bore Ø .59[15] x .31[8]  
Deep, Typ. 2 PLCS.



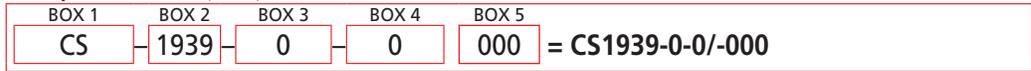
Metric dimensions in ( ).

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder CS 1939:



**Example:** NOTE: One option per box



BOX 1	BOX 2
Type	Indicator Code
CS	1939 = Contamination Codes ISO 4406; SAE 4059 (D) / > 4 µm(c) > 6 µm(c) > 14 µm(c) > 21 µm(c) Interface/protocol: CAN/CAN SAE J1939 without Display (Electrical connection Plug M12x1, 5-pole)

BOX 3	BOX 4	BOX 5
Fluids	Mounting	Modification Number
0 = based on Mineral Oil 1 = Phosphate Esters	0 = Inline or hose connection 1 = Flanged connection	000 = Standard K = CS Block Kit (requires mounting option 1)

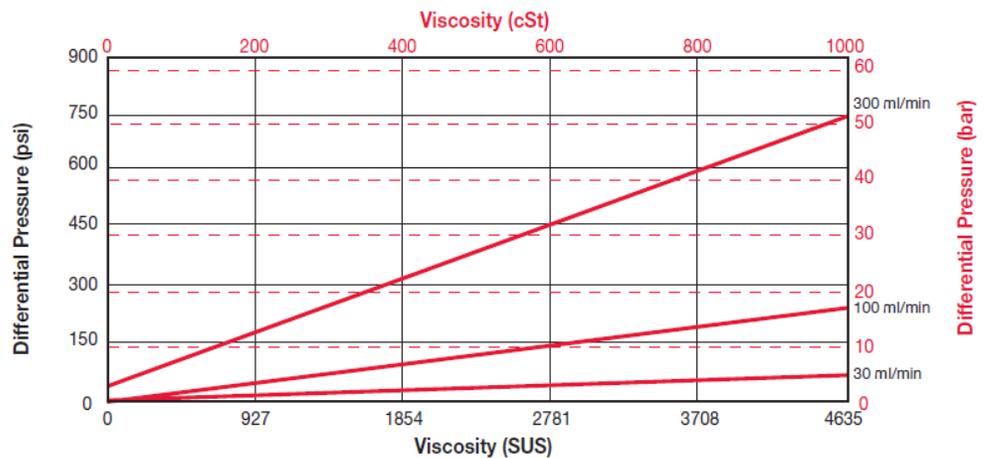
## Scope of Delivery

- Contamination Sensor
- Calibration Certificate
- 2 x O-Ring (only for flange connection version)
- CD with FluMoS Light Software and manual
- CD with detailed operating and maintenance instructions in different languages (PDF viewer software required)

## Accessories

Designation	Part-No.
<b>Supply voltage</b>	
Female connector with 5 m cable, screened, 5-pole, M12x1	3527626
Female connector with 10 m cable, screened, 5-pole, M12x1	3527627
Extension cable 5 m, female connector 5-pole, M12x1 / Male connector 5-pole, M12x1	6040852
Female connector with screw terminal, 5-pole, M12x1	6049128
CSI-D-5 Contamination sensor interface	3249563
FluMoS Professional Software (CD)	3371637

## Pressure - Viscosity Range



# ConditionSensor Interface

# CSI-C-11

CS 1000

CS 1939

CSI-C-11



## Features and Benefits

- Ability to view in real-time measured contamination results via Wireless Connection or *Bluetooth*® wireless technology with the FluMoS Mobile App
- Storage of the measured data directly on the CSI-C-11
- Easily interface digital sensors into existing LAN network
- Direct connection of up to two (2) SMART sensors via M12x1 connectors
- Integral bracket allows for easy installation on existing machines
- Due to high protection class of IP66, no switch cabinet for installation is required



- Usable with FluMoS Mobile App

HY-TRAX®

RBSA

CSM

TFL

TFH

FCU

MCS

AS

SMU

CTU

EPK

Trouble  
Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSa

HFS-BC

HFS-15

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MFS, MFD

HY-TRAX®  
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LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

SVD

OXS

Appendix

## Market Applications

- Construction Equipment
- Agricultural Machinery
- Test Benches
- Industrial Hydraulic Systems
- Combination with Filter Unit
- Power Units
- Any hydraulic system that requires on-line monitoring
- Mobile and Stationary Mining Equipment

The ConditionSensor Interface CSI-C-11 is used to transmit digital sensor signals into a network protocol (HSI TCP/IP or Modbus® TCP), which can be transmitted to a stationary or mobile device via network cable (LAN) or wireless connection (W-LAN). Moreover, the CSI-C-11 is equipped with an internal memory and can be used as a data logger.

At the interface module, up to two sensors can be connected via M12 connector and supplied with power. In addition, the CSI-C-11 is equipped with an Ethernet connector (M12x1 socket), which allows the integration of connected sensors into company networks and control systems (PLC).

## Description

## Specifications

HSI Interface:	Schroeder Sensor Interface for digital coupling of sensors
Ethernet Protocol:	10 Base-T / 100 Base-TX HSI TCP/IP (Port 49322)
W-LAN (HSI only):	Modbus® TCP (Port 502)
2,4 GHz, IEEE 802.11 b/g/n:	
Operating temp. range:	-13 to 185°F (-25 to 85°C)
Storage temp. range:	-22 to 185°F (-30 to 85°C)
Relative humidity:	0 ... 70 %, non-condensing
CE marked:	EN 61000-6-2, EN 61000-6-4
Protection class according to DIN 40050:	IP 66
Supply Voltage:	12 ... 24 V DC ± 10 %
Current requirement (module):	100 mA (plus the consumption of the connected sensors)
Sensor supply:	12 ... 24 V DC (looped through)
Electrical connection:	Supply voltage: Connector, M12, 5-pole, male SMART Sensor 1: Connector, M12, 8-pole, female SMART Sensor 2: Connector, M12, 5-pole, female LAN: Connector, M12, 4-pole, coding D (according to IEC61076-2-101), female W-LAN antenna: Connector, RP-SMA socket, female
Parameterisation:	via connector M12x1, 5-pole acc. to DIN VDE 0627 or W-LAN (FluMoS mobile)
Dimensions:	5.2" x 3.1" x 1.4" (131 x 77.5 x 35.5 mm)
Housing:	die cast aluminium
Weight:	0.79 lb. (≈ 360 g)
Size:	64 mB

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder CSI-C-11:



**Example:** NOTE: One option per box

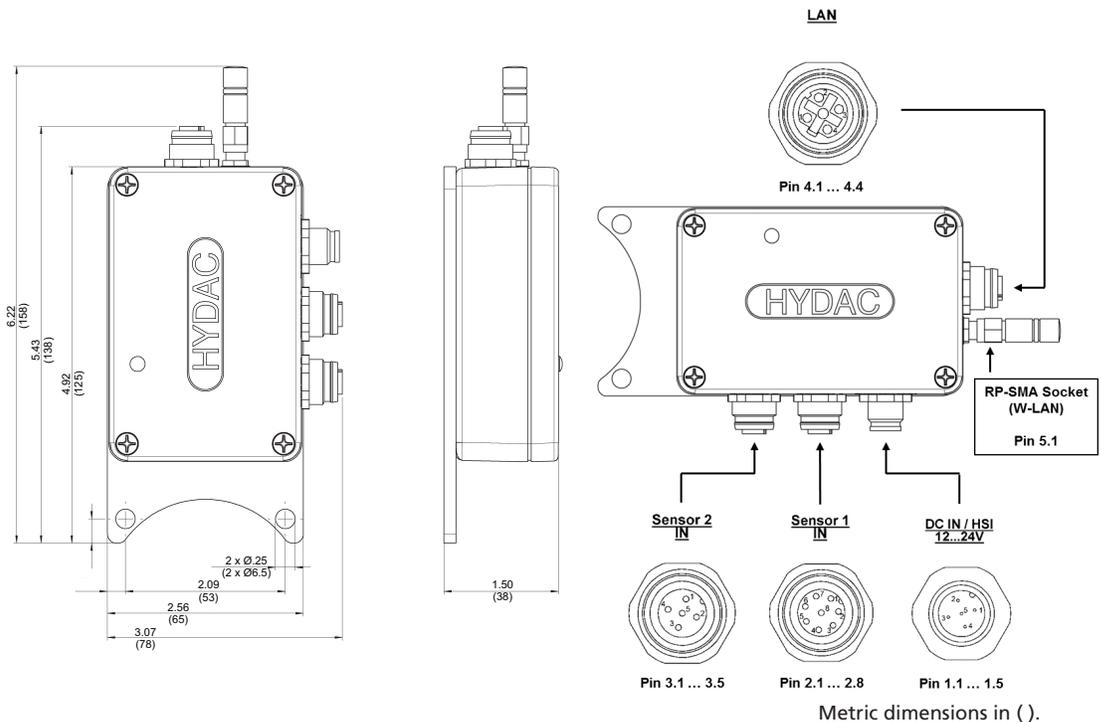


BOX 1	BOX 2	BOX 3	BOX 4
Type	Housing	Output Type	Modification
CSI	C = Aluminum Housing	11 = HSI Ethernet / W-LAN	000 = Standard

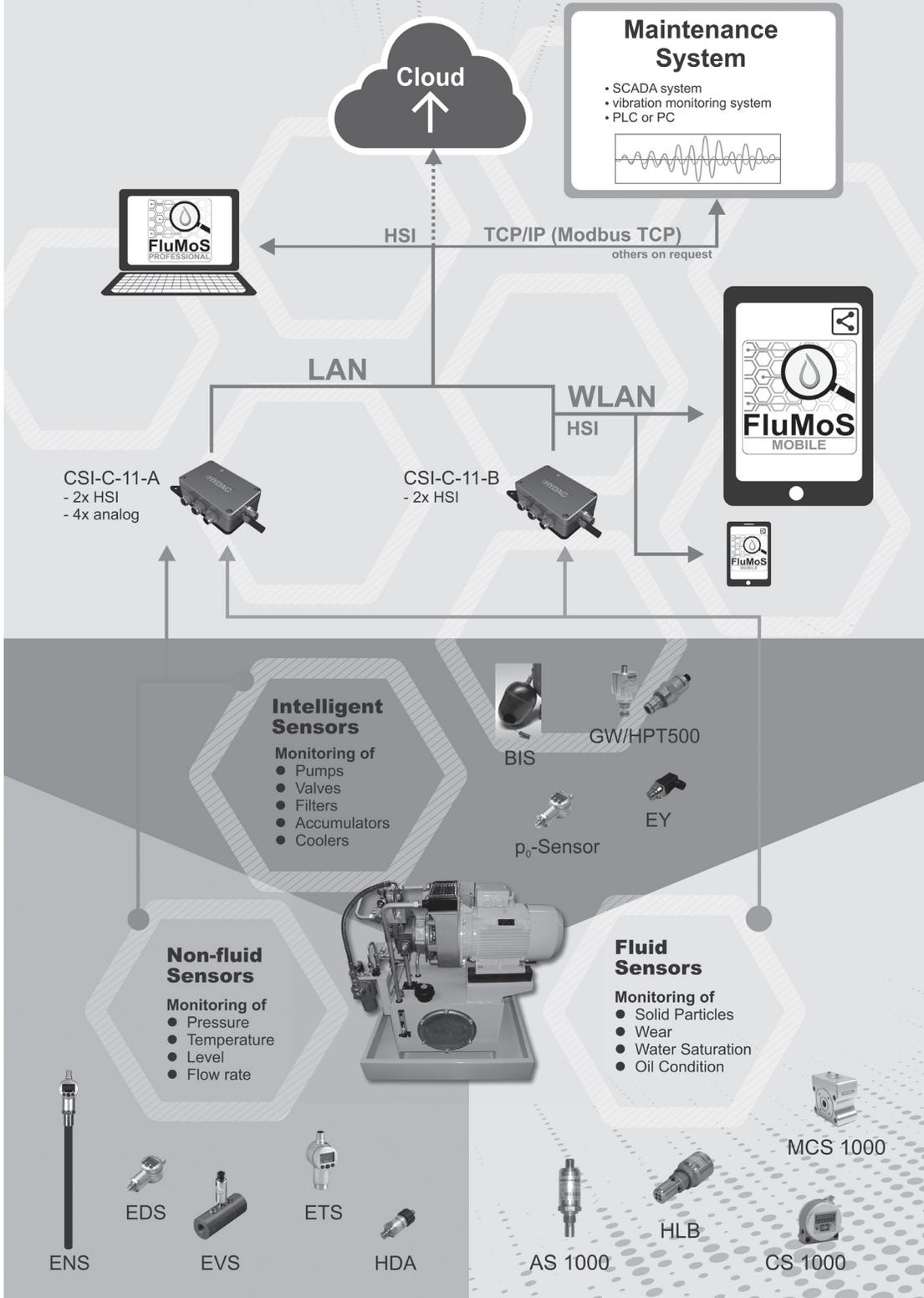
## Accessories

Designation	Part-No.
<b>Supply voltage</b>	
PS5 power supply 100 – 240V AC, 50-60 Hz, 1,1 A, IP40; connector M12, 5-pole, female	3399939
ZBE-43-05 connecting cable, connector 5-pole with cable, length = 16.4 ft. (5 m)	3281240
ZBE-43-10 connecting cable, connector 5-pole with cable, length = 32.8 ft. (10 m)	3519768
<b>Sensor connection cable for CSM-E</b>	
ZBE43-005 connecting cable CSI-C-11, coupling / plug 8-pole, length = 1.6 ft. (0.5 m)	4193544
ZBE30-005 connecting cable CSI-C-11, coupling / plug 5-pole, length = 1.6 ft. (0.5 m)	4193586
<b>Network cable (LAN)</b>	
ZBE 45-05 network cable (Patch), connector 4-pole, coding D / connector RJ45, length = 16.4 ft. (5 m)	3346100
ZBE 45-10 network cable (Patch), connector 4-pole, coding D / connector RJ45, length = 32.8 ft. (10 m)	3346101

## Dimensions



## Predictive Maintenance 4.0



### Predictive Maintenance

HY-TRAX®

RBSA

CSM

TFL

TFH

FCU

MCS

AS

SMU

CTU

EPK

Trouble Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSA

HFS-BC

HFS-15

MFD-BC

MFS, MFD

HY-TRAX® Retrofit System

MFD-MV

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AMS, AMD

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KLS, KLD

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LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

SVD

OXS

Appendix

## Plug Pin Assignment

Pin	Signal	Description	
1.1	Vin 12 ... 24 V DC	Device (CSI-C-11)	Power supply +
1.2	---	Device (CSI-C-11)	n.a.
1.3	GND	Device (CSI-C-11)	Power supply GND
1.4	---	Device (CSI-C-11)	n.a.
1.5	HIS	Device (CSI-C-11)	Parameterisation
2.1	S1 12 ... 24 V DC	Sensor 1	Power supply +
2.1	---	Sensor 1	n.a.
2.3	S1 GND	Sensor 1	Power supply GND
2.4	---	Sensor 1	n.a.
2.5	S1 HIS	Sensor 1	HSI signal
2.6	---	Sensor 1	n.a.
2.7	---	Sensor 1	n.a.
2.8	---	Sensor 1	n.a.
3.1	S2 12 ... 24 V DC	Sensor 2	Power supply +
3.2	---	Sensor 2	n.a.
3.3	S2 GND	Sensor 2	Power supply GND
3.4	---	Sensor 2	n.a.
3.5	S2 HIS	Sensor 2	HSI signal
4.1	ETH TX+	Network (LAN)	Ethernet port data transmission +
4.2	ETH RX+	Network (LAN)	Ethernet port data receive +
4.3	ETH TX-	Network (LAN)	Ethernet port data transmission -
4.4	ETH RX-	Network (LAN)	Ethernet port data receive -
5.1	ANT	Network (W-LAN)	RP-SMA-socket W-LAN-antenna

# Manually Controlled Fluid Sampling System

Patent pending



## Features and Benefits

- Provides Local Visibility to the Fluid Condition of Critical Systems.
- Integrated micro VSD, (Variable Speed Drive), pump/motor provides optimal flow for accurate sensor readings in variable conditions.
- The HY-TRAX® Manually Controlled Fluid Sampling System allows a user to retrieve ISO cleanliness levels from a reservoir tank or a low-pressure line (<50 psi max).
- The compact design allows for installations with tight space constraints.
- The Manual rheostat VSD pump controller is housed in a compact IP 40 enclosure and allows the user to adjust the pump flow for optimal sensor readings.
- Optional AC adapter allows the unit to operate on 115 VAC 60 Hz. 24 VDC is standard.
- Rugged design for field use.
- Viton® seals.
- Fluid viscosities up to 350 cSt.
- Flow control valve providing optimal pressure for accurate sensor readings.



## Applications

- Mobile Equipment Technology
- Surface Mining
- Construction
- Monitoring of Oil Cleanliness in Storage Tanks
- Fleet Services
- Rail

- TestMate® Contamination Monitor (TCM)
- Machined, 6061-T651 aluminum alloy manifold block with anodized surface treatment.
- Specially designed fitting for mating to pump/motor.
- Viton® seals.
- Plugged water sensor port (G3/8)
- VSD (Variable Speed Drive) Motor Power Supply and Control Cable
- Water Sensor (TWS-D) Power Supply and Signal Cable (only supplied with optional water sensor (TWS-D))
- Contamination Monitor (TCM) output signal, USB-B Female Port for use with Windows-Based Computer and FluMoS Software, located on Control Enclosure
- Contamination Monitor (TCM), output signal, M12x1, 8 pole, Male Port, located on Control Enclosure, for use with PLC or RS485 Communication, analog or digital, 4 - 20 mA is standard, 2 to 10 V is optional

- Flow control valve
- VSD (Variable Speed Drive) pump/motor
- Manual rheostat pump controller
- IP 40 enclosure
- Fluid Inlet/Outlet Porting (SAE Size 04 ORB)
- 24 VDC Power Supply (NC3MP Female Connector)
- Optional 115 VAC Power Supply with Cord
- Contamination Monitor (TCM) Power and Signal Cable
- Water Sensor (TWS-D) M12x1, 5 pole Signal Output Connection, Male Port, located on Control Enclosure
- Contamination monitor (TCM) power connection, female M12x1, 8 pole located on control enclosure
- Water sensor (TWS-D) power connection, M12x1, 5 pole Female located on control enclosure

## Manually Controlled Fluid Sampling System

## What's Included

CS 1000

CS 1939

CSI-C-11

HY-TRAX®

RBSA

CSM

TFL

TFH

FCU

MCS

AS

SMU

CTU

EPK

Trouble  
Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSA

HFS-BC

HFS-15

MFD-BC

MFS, MFD

HY-TRAX®  
Retrofit System

MFD-MV

MFS-HV

AMS, AMD

FS

AMFS

KLS, KLD

MCO

AKS, AKD

LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

SVD

OXS

Appendix



# Manually Controlled **HY-TRAX**<sup>®</sup> Fluid Sampling System

## Specifications

Measuring Range:	Display ISO ranges between 25/24/23 and 9/8/7 Calibration within the range ISO 13/11/10 to 23/21/18
Contamination Output Code:	Standard: ISO 4406:1999 or SAE AS 4059(D) Optional: ISO 4406:1987; NAS 1638 and ISO 4406:1999
Self-Diagnosis:	Continuously with error indication via status LED
Pressure Rating:	50 psi (3.4 bar) max
Fluid Inlet/Outlet:	SAE ORB, Size 4
Seal Material:	Viton <sup>®</sup>
Pump Speed:	500-5000 rpm (adjustable)
Optimal Sampling Pump Flow Rate:	0.008-0.079 gpm (30-300 mL/min)
Fluid Temperature Range:	32°F to 185°F (0°C to +85°C)
Ambient Temperature Range:	-22°F to 176°F (-30°C to 80°)
Max Viscosity:	1622 SUS (350 cSt)
Pump Type:	Gear Pump
Power Supply Voltage:	24 VDC +/- 10%, Residual Ripple <10%
Max Power/Current Consumption:	100 Watt/ 4 amp
Electric Output:	4-20 mA analog output; 2 to 10 V analog (option for contamination monitor (CS)) RS485 for communication with FluMoS Software
Electrical Specifications:	4 - 20 mA analog output (max burden 330 Ω) 2 to 10 V output (min load resistor 82 Ω) Limit switching output (Power MOSFET): max current 1.5A
TestMate <sup>®</sup> Contamination Monitor (TCM) Signal Output Connections Located on Control Enclosure:	USB-B Female Port for use with Windows-based computer and FluMoS Software M12x1, 8 pole, Male Port, Analog or Digital, for use with PLC or RS485 Communication, (4 - 20 mA is standard). 2 to 10 V is optional, must specify when ordering TestMate <sup>®</sup> Contamination Monitor (TCM)
Water Sensor (TWS-D) Signal Output Connection Located on Control Enclosure:	Water sensor (TWS-D) M12x1, 5 pole Signal Output 5 pole Male Port, located on Control Enclosure
Electrical Safety Class:	III (low voltage protection)
Enclosure Ratings:	IP 40 enclosure

Weight and Dimensions			
Communications Module Control TestMate <sup>®</sup> Sensor	Fluid Sampling System Manifold w/ TCM & VSD Pump/Motor	HY-TRAX <sup>®</sup> Manual Control Module	Fluid Sampling Manifold w/ Communications Module & VSD Pump/Motor
	10 lbs. (4.5 kg)	5 lbs. (2.5 kg)	15 lbs. (6.8 kg)
	10.3" x 6.8" x 4.3" (262 x 173 x 109 mm)	9.3" x 5.7" X 2.6" (236 X 145 x 65 mm)	

## Features and Benefits

- Provides Local Visibility to the Fluid Condition of Critical Systems.
- Integrated micro VSD, (Variable Speed Drive), pump/motor provides optimal flow for accurate sensor readings invariable conditions.
- Designed to be used with Schroeder Industries TestMate® contamination monitor (TCM) and optional water sensor.
- The HY-TRAX® Manually Controlled Fluid Sampling System allows a user to retrieve ISO cleanliness levels from a reservoir tank or a low-pressure line (50 psi max).
- The compact design allows for installations with tight space constraints.
- The Manual VSD pump controller is housed in a compact IP 40 enclosure and allows the user to adjust the pump flow for optimal sensor readings.
- Optional AC adapter allows the unit to operate on 115 VAC 60 Htz.
- Rugged design for field use.
- Viton® seals.
- Fluid viscosities up to 350 cSt.
- Flow control valve providing optimal pressure for accurate sensor readings.
- Manual rheostat control adjusts VSD (Variable Speed Drive) pump speed to adjust for variances in fluid viscosities.
- Machined, 6061-T651 aluminum alloy manifold block with anodized surface treatment.
- Specially designed fitting for mating to pump/motor.
- Viton® seals.
- Plugged water sensor port (G3/8)
- VSD (Variable Speed Drive) Motor Power Supply and Control Cable
- Flow control valve
- VSD (Variable Speed Drive) pump/motor
- Manual rheostat pump controller
- IP 40 enclosure



*For Customers who have a TestMate® Contamination Monitor (TCM)*

- Fluid Inlet/Outlet Porting (SAE Size 04 ORB)
- 24 VDC Power Supply (NC3MP Female Connector)
- Optional 115 VAC Power Supply with Cord
- Water Sensor (TWS-D) M12x1, 5 pole Signal Output Connection, Male Port, located on control enclosure
- TestMate® Contamination monitor (TCM) power connection, female M12x1, 8 pole located on control enclosure
- Water sensor (TWS-D) power connection, M12x1, 5 pole Female located on control enclosure

## What's Included



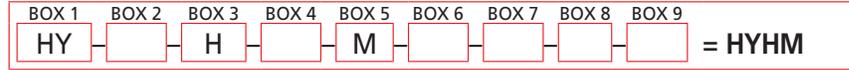
# Manually Controlled **HY-TRAX**<sup>®</sup> Fluid Sampling System

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder HY-TRAX<sup>®</sup> Manually Controlled Fluid Sampling System:



**Example:** NOTE: One option per box



BOX 1	BOX 2	BOX 3	BOX 4
<b>Model</b>	<b>TestMate<sup>®</sup> Contamination Monitor (TCM)</b>	<b>Fluid Type</b>	<b>TestMate<sup>®</sup> Contamination Monitor (TCM) Signal Output</b>
HY	Omit = TCM w/ display ND = TCM w/ no display NT = Manifold supplied w/ no TCM, Customer will supply TCM (manifold mount version needed)	H = For use w/ Hydraulic & Diesel Fuel only*	Omit = 4-20 mA S = 2 to 10 V analog output

BOX 5	BOX 6
<b>TestMate<sup>®</sup> Contamination Monitor (TCM) Output Options</b>	<b>Water Sensor (TWS) Option</b>
M = ISO 4406/SAE 4049 N = ISO 4406/NAS 1638	Omit = None TWS-D = Water sensor w/ display

BOX 7	BOX 8	BOX 9
<b>Manually Controlled Sampling System</b>	<b>Power Options</b>	<b>Air Suppression Loop</b>
Omit = Panel with Rheostat flow control, power and signal output for HY-TRAX <sup>®</sup> sampling system	Omit = 24 VDC P = 115 VAC	Omit = None L = Looped hose and fitting

**\*Note:** Off-road diesel contains dye. High concentrations of dye may interfere with particle count results. Please contact factory to review application.

## Features and Benefits

- Provides Remote Visibility to the Fluid Condition of Critical Systems.
- Integrated micro VSD, (Variable Speed Drive), pump/motor provides optimal flow for accurate sensor readings in variable conditions.
- This HY-TRAX® Remote Oil Contamination Sensor Package allows remote access via the Internet and smart devices to fluid particle counts, temperature, and percent water saturation levels (optional) displayed on a customizable dashboard. The fluid sampling system collects data and the communications module transmits this data via GSM cellular at scheduled intervals. Users can receive alerts via email when a fluid's ISO contamination code or water saturation level (optional) reaches user defined critical levels. The unit can sample fluid directly from a fluid reservoir or low pressure line (<50 psi).
- The Communications Module automatically controls fluid flow to compensate for viscosity changes due to temperature or fluid type. All data is transmitted through a secure VPN and archived in a protected database in the cloud to allow real-time and historical analysis.
- The HY-TRAX® Communications Module will provide maintenance managers with the visibility and vital information necessary to pro-actively schedule preventative maintenance on local and remote equipment. Maintenance decisions can now be based on accurate and real-time data.
- The communications module components are mounted and housed in a rugged IP 40 enclosure.
- Fluid sampling system standard with Viton® seals.
- Fluid viscosities up to 350 cSt.
- 50 psi (max.) working pressure.
- Flow control valve providing optimal pressure for accurate sensor readings.
- VSD, (Variable Speed Drive), pump/motor providing optimal flow for accurate sensor readings.



## Applications

- Mobile Equipment Technology
- Surface Mining
- Construction
- Monitoring of Oil Cleanliness in Storage Tanks
- Fleet Services
- Rail

- TestMate® Contamination monitor (TCM)
- Flow Control Valve
- GSM cellular communications
- VSD pump/motor
- Machined, 6061-T651 aluminum alloy manifold block with anodized surface treatment
- TestMate® Contamination Monitor (TCM) Communications/Power Cable
- Specially designed fitting for mating to pump/motor
- Plugged water sensor port (G3/8)
- IP 40 enclosure
- Water sensor (optional)
- 24 volts DC standard with optional 115 VAC Power Supply
- Optional Water Sensor (TWS-D) Communication/Power Cable
- Fluid Inlet/Outlet Porting (SAE Size 04 ORB)

## Communications Module with Remote Controlled Sampling System

HY-TRAX®

RBSA

CSM

TFL

TFH

FCU

MCS

AS

SMU

CTU

EPK

Trouble Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSA

HFS-BC

HFS-15

MFD-BC

MFS, MFD

HY-TRAX® Retrofit System

MFD-MV

MFS-HV

AMS, AMD

FS

AMFS

KLS, KLD

MCO

AKS, AKD

LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

SVD

OXS

Appendix

## What's Included



# Telematic Communications Module with Remote Controlled Sampling System



## Specifications

Measuring Range:	Display ISO ranges between 25/24/23 and 9/8/7 Calibration within the range ISO 13/11/10 to 23/21/18
Contamination Output Code:	Standard: ISO 4406:1999 or SAE AS 4059(D) Optional: ISO4406:1987; NAS 1638 and ISO 4406:1999
Self-Diagnosis:	Continuously with error indication via status LED
Pressure Rating:	50 psi (3.4 bar) max
Fluid Inlet/Outlet:	SAE ORB, Size 4
Seal Material:	Viton®
Pump Speed:	500-5000 rpm (adjustable)
Optimal Sampling Pump Flow Rate:	0.008-0.079 gpm (30-300 mL/min)
Fluid Temperature Range:	32°F to 185°F (0°C to +85°C)
Ambient Temperature Range:	-22°F to 176°F (-30°C to 80°)
Max Viscosity:	1622 SUS (350 cSt)
Pump Type:	Gear Pump
Power Supply:	24 volts DC
Power Consumption:	4A
Communications Module Signal Output:	GSM cellular Communication to monitoring website
Electrical Safety Class:	III (low voltage protection), IP 40 enclosure
Cellular Communications:	AT&T Quad Band GSM (850, 900, 1800, 1900 MHz)

### Weight and Dimensions

Communications Module Control TestMate® Sensor	Fluid Sampling System Manifold w/ TCM & VSD Pump/Motor	HY-TRAX® Communications Module	Fluid Sampling Manifold w/ Communications Module & VSD Pump/Motor
	10 lbs. (4.5 kg)	10 lbs. (4.5 kg)	20 lbs. (9.1 kg)
	10.4" x 6.8" x 4.3" (264 x 173 x 109 mm)	14.7" x 11.3" x 5.25" (374 x 287 x 133 mm)	

### Features and Benefits

- Integrated micro VFC, (Variable Speed Drive), pump/ motor provides optimal flow for accurate sensor readings in variable conditions
- Rugged design for field use
- Fluid viscosities up to 350 cSt
- 50 psi (max.) working pressure
- Flow control valve providing optimal pressure for accurate sensor readings
- Designed to be used with Schroeder Industries' communications module and optional water sensor

### What's Included

- Machined, 6061-T651 aluminum alloy manifold block with anodized surface treatment.
- Specially designed fitting for mating to pump/motor.
- Viton® seals.
- Plugged water sensor port (G3/8)
- Flow control valve
- Contamination Monitor
- Micro VSD pump/motor
- Fluid Inlet/Outlet Porting (SAE Size 04 ORB)



**HY-TRAX®**  
Fluid Sampling System Manifold with Contamination Sensor and VSD Pump/ Motor

### Features and Benefits

- Provides Remote Visibility to the Fluid Condition of Critical Systems.
- Integrated micro VSD, (Variable Speed Drive), pump/ motor provides optimal flow for accurate sensor readings in variable conditions.
- Designed to be used with Schroeder Industries contamination monitor (TCM - manifold mount version only) and optional water sensor.
- This HY-TRAX® Remote Oil Contamination Sensor Package allows remote access via the Internet and smart devices to fluid particle counts, temperature, and percent water saturation levels (optional) displayed on a customizable dashboard. The fluid sampling system collects data and the communications module transmits this data via GSM cellular at scheduled intervals or on demand. Users can receive alerts via email when a fluid's ISO contamination code or water saturation level (optional) reaches user defined critical levels. The unit can sample fluid directly from a fluid reservoir or low pressure line (<50psi).
- The Communications Module automatically controls fluid flow to compensate for viscosity changes due to temperature or fluid type. All data is transmitted through a secure VPN and archived in a protected database in the cloud to allow real-time and historical analysis.
- The HY-TRAX® Communications Module will provide maintenance managers with the visibility and vital information necessary to pro-actively schedule preventative maintenance on local and remote equipment. Maintenance decisions can now be based on accurate and real-time data.
- The communications module components are mounted and housed in a rugged weatherproof IP 40 enclosure.
- Fluid sampling system standard with Viton® seals.
- Fluid viscosities up to 350 cSt.
- 50 psi (max.) working pressure.
- Flow control valve providing optimal pressure for accurate sensor readings.
- VSD, (Variable Speed Drive), pump/motor providing optimal flow for accurate sensor readings.



*For Customers who have a TestMate® Contamination Monitor (CS) (CS must be 4-20 mA output)*

### What's Included

- Flow Control Valve
- GSM cellular communications
- VSD pump/motor
- Machined, 6061-T651 aluminum alloy manifold block with anodized surface treatment
- Specially designed fitting for mating to pump/motor
- IP 40 enclosure
- Plugged water sensor port (G3/8)
- Fluid Inlet/Outlet Porting (SAE Size 04 ORB)

**HY-TRAX®**  
Fluid Sampling Manifold with Communications Module and VSD Pump/ Motor

**HY-TRAX®**  
Telematics Communications Module only operates with TCM's operating on Firmware 3.0 and 4-20 mA outputs. Older firmware versions will not communicate proper flow rate to the telematics module. Contact factory for more details.



# Telematic Communications Module with Remote Controlled Sampling System



## HY-TRAX® Communications Module

HY-TRAX® Telematics Communications Module can be utilized on existing CS installations when the sensor receives adequate pressure (>120 psi) and flow (30-150 mL/min) from the hydraulic system. The CS must have 4-20 mA outputs and Firmware version 3.0.



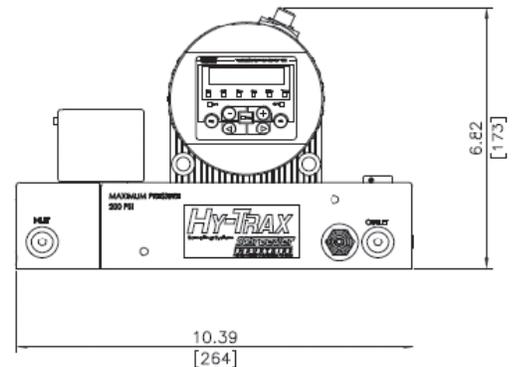
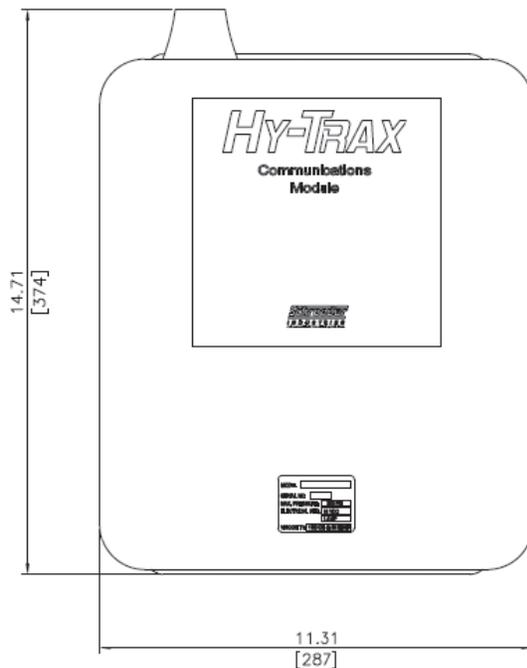
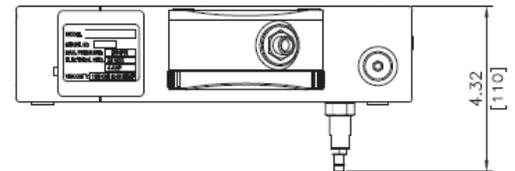
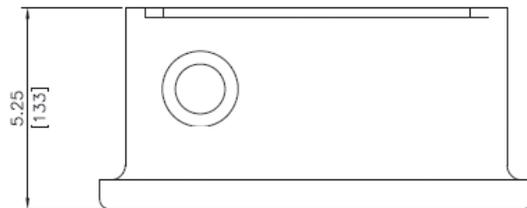
*HY-TRAX® Communications Module Only.  
Order part # HY-COMMMOD*

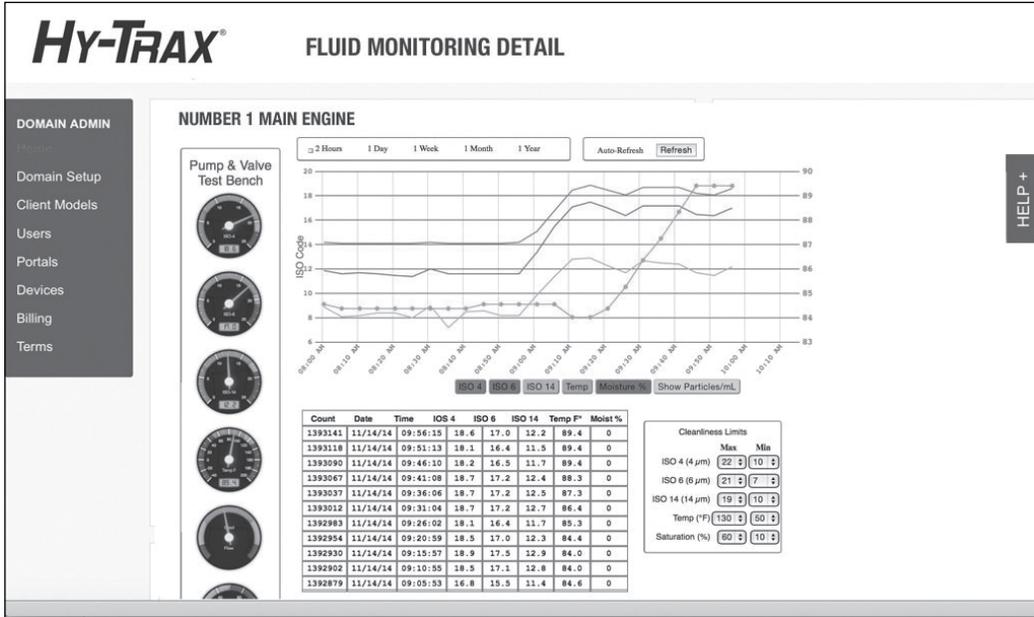
### What's Included

- GSM cellular communications
- IP 40 enclosure
- VSD, (Variable Speed Drive), Motor Controller
- 115 VAC Power Supply

### Features and Benefits

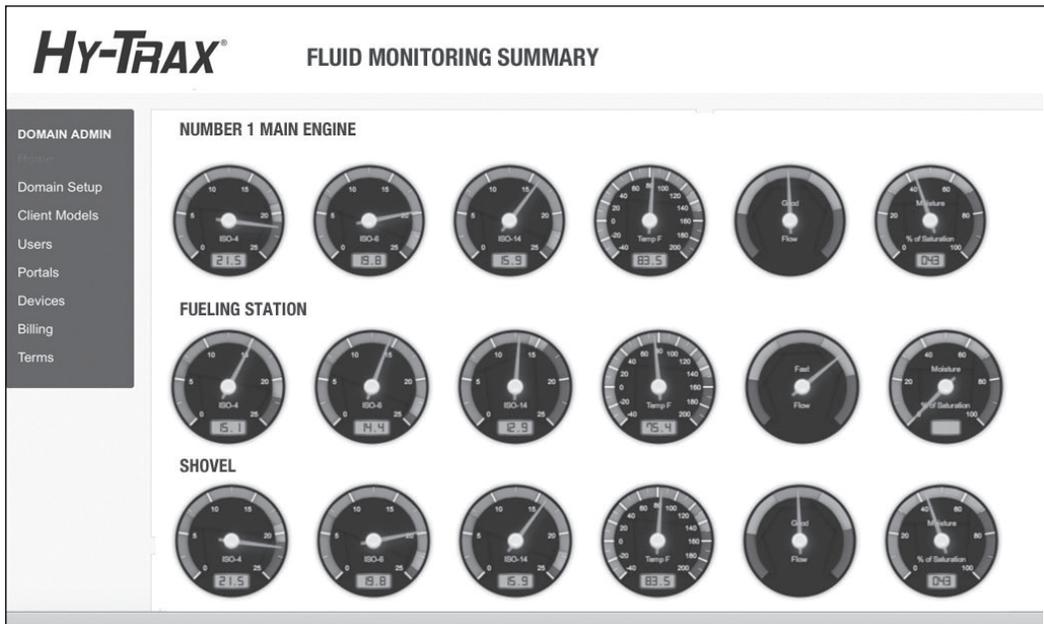
- Provides remote visibility to the fluid condition of critical systems.
- The HY-TRAX® Remote Oil Contamination Communications Module allows remote access via the Internet and smart devices to fluid particle counts, temperature and percent water saturation levels (optional) displayed on a customizable dashboard. The Communications Module collects and transmits data via GSM cellular at scheduled intervals. Users can receive alerts via email or text when the fluid's ISO contamination code or water saturation level (optional) reaches user defined critical levels.
- The Communications Module automatically controls fluid flow to compensate for viscosity changes due to temperature or fluid type. All data is transmitted through a secure VPN and archived in a protected database in the cloud to allow real-time and historical analysis.
- The HY-TRAX® Communications Module will provide maintenance managers with the visibility and vital information necessary to pro-actively schedule preventative maintenance on local and remote equipment. Maintenance decisions can now be based on accurate and real-time data.
- The communications module components are mounted and housed in a rugged IP 40 enclosure.





Example of HY-TRAX® Communications Modules Dashboard Contamination Chart

- RBSA
- CSM
- TFL
- TFH
- FCU
- MCS
- AS
- SMU
- CTU
- EPK
- Trouble Check Plus
- HMG2500
- HMG4000
- ET-100-6
- HTB
- RFSA
- HFS-BC
- HFS-15
- MFD-BC
- MFS, MFD
- HY-TRAX® Retrofit System
- MFD-MV
- MFS-HV
- AMS, AMD
- FS
- AMFS
- KLS, KLD
- MCO
- AKS, AKD
- LSN, LSA, LSW
- X Series
- OLF Compact
- OLF
- OLF-P
- NxTM
- VEU
- IXU
- Triton-A
- Triton-E
- NAV
- SVD01
- SVD
- OXS



Example of HY-TRAX® Communications Modules Dashboard Gauge Panel

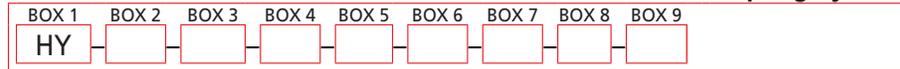


# Telematic Communications Module with Remote Controlled Sampling System

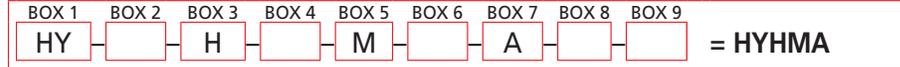


## Model Number Selection

### How to Build a Valid Model Number for a Schroeder HY-TRAX<sup>®</sup> Telematic Communications Module with Remote Controlled Fluid Sampling System:



**Example:** NOTE: One option per box



HY-TRAX<sup>®</sup> Telematics Communications Module only operates with CS's operating on Firmware V03.00. Older firmware versions will not communicate proper flow rate to the telematics module. Contact factory for additional information.

BOX 1	BOX 2	BOX 3	BOX 4
<b>Model</b>	<b>TestMate<sup>®</sup> Contamination Monitor (TCM)</b>	<b>Fluid Type</b>	<b>TestMate<sup>®</sup> Contamination Monitor (TCM) Signal Output</b>
HY	Omit = TCM w/ display ND = TCM w/ no display NT = Manifold supplied w/ no TCM, Customer will supply TCM; TCM must be 4-20 mA output only	H = For use w/ Hydraulic & Diesel Fuel only*	Omit = 4-20 mA  <i>NOTE: For customers with existing TCMS w/ a 2 to 10 V analog output please see HY-TRAX<sup>®</sup> Manually Controlled Sampling System</i>

BOX 5	BOX 6	BOX 7
<b>TestMate<sup>®</sup> Contamination Monitor (TCM) Output Options</b>	<b>Water Sensor (TWS) Option</b>	<b>Communications Module w/ Remote Controlled Fluid Sampling System</b>
M = ISO 4406/SAE 4049 N = ISO 4406/NAS 1638	Omit = None TWS-D = Water sensor w/ display	A = Telematic Communications Module w/ Dashboard Data Display (GSM Cellular) <i>NOTE: For customers with existing TCMS w/ a 2 to 10 V analog output please see HY-TRAX<sup>®</sup> Manually Controlled Sampling System</i>

BOX 8	BOX 9
<b>Communications Module Power Options</b>	<b>Air Suppression Loop</b>
Omit = 24 VDC P = 115 VAC	Omit = None L = Looped hose and fitting

\*Note: Off-road diesel contains dye. High concentrations of dye may interfere with particle count results. Please contact factory to review application.

# Reservoir Breather Fluid Sampling Adapter



CS 1000

CS 1939

CSI-C-11

HY-TRAX®

**RBSA**

CSM

TFL

TFH

FCU

MCS

AS

SMU

CTU

EPK

Trouble  
Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSA

HFS-BC

HFS-15

MFD-BC

MFS, MFD

HY-TRAX®  
Retrofit System

MFD-MV

MFS-HV

AMS, AMD

FS

AMFS

KLS, KLD

MCO

AKS, AKD

LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

SVD

OX5

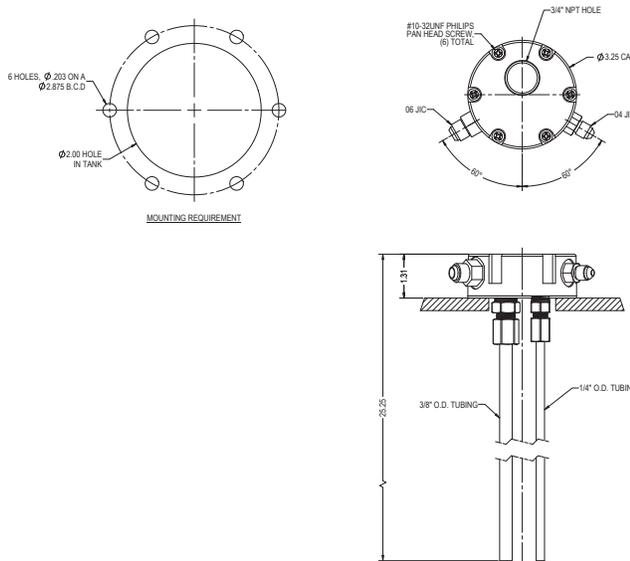
Appendix

## Features and Benefits

- Drop-in reservoir breather retrofit for fluid sampling provides clean easy access to the reservoir through the existing breather part
- Provides easy fluid quality sampling solution for HY-TRAX® and return ports
- HY-TRAX® adapter kit includes #6 & #4 JIC adapters with 6' connection hoses included
- 24" SS drop tubes can be cut to length
- Standard 6 bolt breather pattern
- Anodized 6061 aluminum breather
- 3/4" NPT for breather element

## Market Applications

- All applications with a hydraulic reservoir utilizing a 6-bolt mounting connection



## Mounting Requirement

## Specifications

Reservoir Mounting Pattern: Fits standard 6-bolt

Supply Port Thread Size: 9/16-18 UN

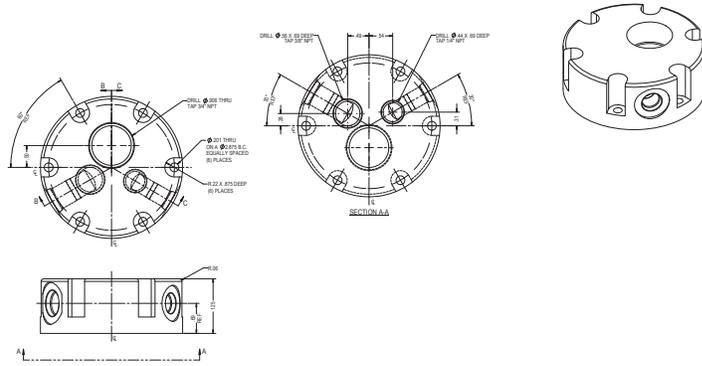
Return Port Thread Size: 7/16-20 UN

Breather Port Thread Size: 3/4" NPT

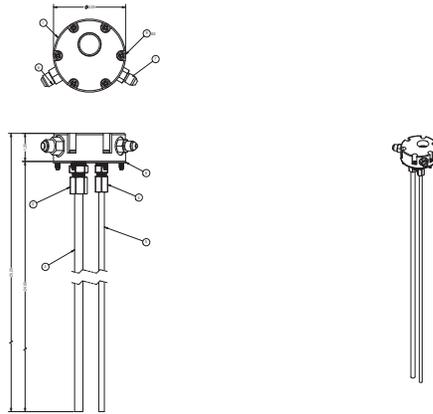
Fittings: #6 & #4 JIC fittings and 6' supply/return hoses.

Return Tubes: Supplied with 3/8" and 1/4" return tubes. Tubes are 24" long and can be shortened if necessary. Housing constructed 6061 anodized aluminum.

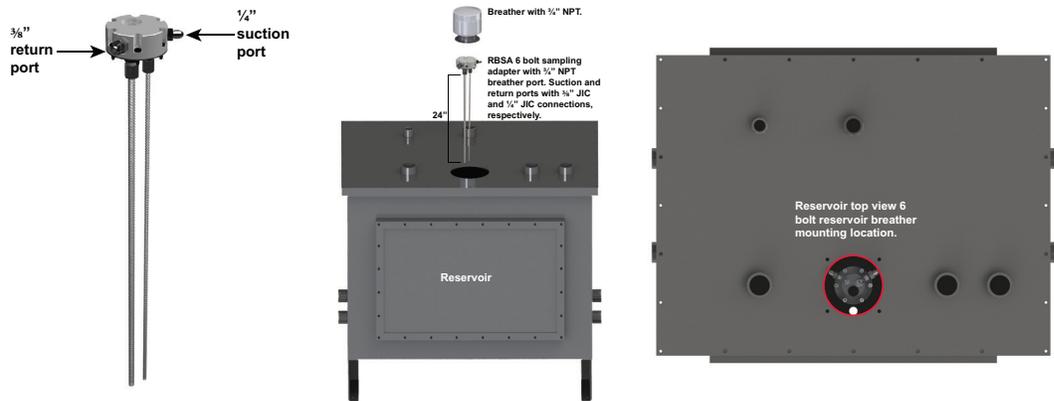
## Application Example



## Parts List Drawing



## Reservoir Mounting Views



## Model Number Selection

### How to Build a Valid Model Number for a Schroeder Reservoir Breather Fluid Sampling Adapter RBSA:

BOX 1	BOX 2
RBSA	

**Example:** NOTE: Box 2 can have multiple options.

BOX 1	BOX 2	
RBSA	1	= RBSA-1

BOX 1	BOX 2
Model	Options
RBSA	1 = HY-TRAX® adapter fitting #6 & #4 JIC fittings and 6' supply/return hoses

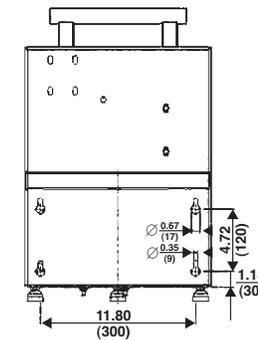
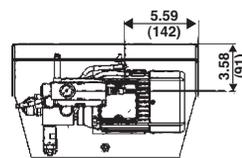
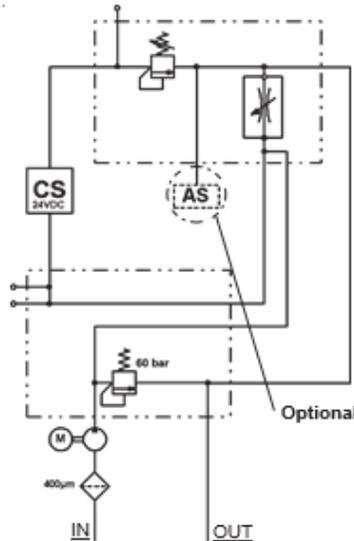
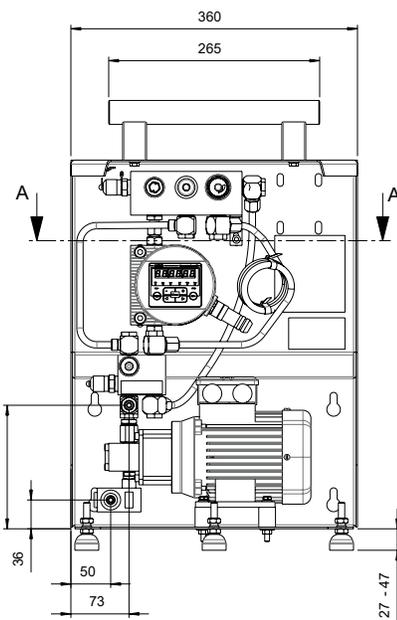
# Contamination Sensor Module **CSM 1000**

Formally Known as "TSU - TestMate® Sensor Unit"

The Contamination Sensor Module (CSM) is an online condition monitoring system for detecting particle contamination in hydraulic and lubrication fluids containing a high proportion of air bubbles. Air bubble suppression is used to dissolve the air bubbles so that they are not detected as particles. Moreover, it is the ideal solution for analyzing the particle content of fluids, independently of the rest of the hydraulic system. As an option, other condition monitoring sensors such as the AS 1000 Series Water Sensor can be incorporated.

## Applications

- Lubrication systems in paper, steel and energy sectors
- Preventive, pro-active preparation of service/intervals
- Monitoring of component cleanliness on test benches
- Monitoring of oil cleanliness in storage tanks



## Description

- CS 1000
- CS 1939
- CSI-C-11
- HY-TRAX®
- RBSA
- CSM**
- TFL
- TFH
- FCU
- MCS
- AS
- SMU
- CTU
- EPK
- Trouble
- Check Plus
- HMG2500
- HMG4000
- ET-100-6
- HTB
- RFSA
- HFS-BC
- HFS-15
- MFD-BC
- MFS, MFD
- HY-TRAX®
- Retrofit System
- MFD-MV
- MFS-HV
- AMS, AMD
- FS
- AMFS
- KLS, KLD
- MCO
- AKS, AKD
- LSN, LSA, LSW
- X Series
- OLF Compact
- OLF
- OLF-P
- NxTM
- VEU
- IXU
- Triton-A
- Triton-E
- NAV
- SVD01
- SVD
- OXS
- Appendix

Basically there are three different possibilities for connecting the CSM to hydraulic and lubrication systems. Select the measuring point according to the type of information the customer requires from the system.

### 1. Measuring from tank

Indicates the overall condition of the oil. Inlet and outlet of the CSM are connected to the tank near the suction of the main pump.

### 2. Measuring from the pressure line before the filter

This is the normal location for taking bottle samples. By using the CSM the amount of bottle sampling can be reduced and information on the oil condition is therefore available immediately. This test point is used mostly in lube systems.

### 3. Measuring from pressure line after the filter

This test point is used in roll hydraulics and the reason for measuring oil after the filter is to ensure that clean oil is always available to the sensitive proportional valves and to other machine parts. Mainly used in roll hydraulics and particularly if customers have had problems with the proportional valves.

**Important!** The pressure should be reduced using a separate valve before the oil goes into the CSM.

## CSM Installation in System

# CSM 1000 Contamination Sensor Module

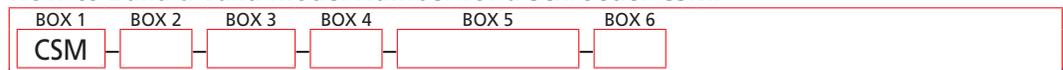
Formally Known as "TSU - TestMate® Sensor Unit"

## Specifications

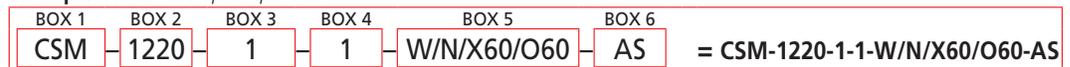
Pump Type:	Gear pump
Operation Pressure:	-5.8 - 7.3 psi (-0.4 to 0.5 bar) (standard pump)
P <sub>in</sub> (INLET):	-5.8 - 1,740 psi (-0.4 to 120 bar) (pump, pressure inlet stable)
P <sub>out</sub> (OUTLET):	73 psi (5 bar)
P <sub>out</sub> (leakage line):	7.3 psi (0.5 bar) (pump, pressure inlet stable)
Permissible Outlet Pressure:	73 psi (5 bar max.)
Connections:	INLET: Thread G 1/4, ISO 228 OUTLET: Thread G 1/4, ISO 228
Total Flow Rate:	approx. 100 mL/min (standard pump) approx. 180 mL/min (pump, pressure inlet stable)
Permissible Visc. Range for Measuring:	10 to 1000 cSt
Permissible Fluid Temp. Range:	32°F to 158°F (0°C to 70°C)
Permissible Fluids:	Hydraulic and lubrication fluids based on mineral oil
Power Consumption:	0.18 kW @ 50 Hz (motor pump group): 0.21 kW @ 60 Hz
Ambient Temperature Range:	32°F to 131°F (0°C to 55°C)
Storage Temperature Range:	-4°F to 185°F (-20°C to 85°C)
Relative Humidity:	max. 90%, not condensing
IP Class:	IP55
Weight:	approx. 40 lbs. (18 kg)
Contamination Sensor:	Self-diagnosis: continuously with error indication via status LED
Measuring Range:	Display from class ISO 9/8/7 (MIN) up to class ISO 25/24/23 (MAX) Calibrated within the range ISO 13/11/10 to ISO 23/21/18
Power Supply Voltage:	9 to 36 VDC, residual ripple <10%
Power Consumption:	3 W max.
Electrical Outputs:	Analog output 4 to 20 mA or 0 to 10 V RS485 interface or switching output

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder CSM:



Example: NOTE: One option per box



BOX 1	BOX 2
Model	Contamination Code
CSM	1220 = ISO 4406:1999; SAE AS 4059(D) 1320 = ISO 4406:1987; NAS 1638

BOX 3	BOX 4	BOX 5	BOX 6
Pump	Output	Electrical Supply	Water Sensor
1 = Standard gear pump	1 = 4-20 mA analog	W/N/X60/O60 = 230/460 V 60Hz 3PH 230/400 V 50Hz 3PH	Omit = None
2 = Pump, increased inlet pressure with oil leakage pipe	2 = 0-10 V analog	L60 = 120V, 60Hz, 1Ph	W = AS 1000 Water Sensor
4 = Pump, increased inlet pressure, no oil leakage line, magnetic drive			

### What's Included

- CSM
- Operating and maintenance instructions
- CD with FluMoS software and manuals
- Calibration certificate contamination sensor

# Schroeder Pro Total Fluid Life

# TFL



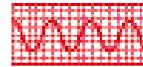
**Laser Particle Counter** - 4, 6, 14, & 21 micron counts displayed as ISO, NAS, & SAE



**Oil Life Sensor** - gives warning of oil life ending and also helps inform if an oil change is required



**Water Sensor** - shows relative humidity of oil as % saturation



**Touch Screen** - allows users to navigate operational functions with ease and analyze data



**Internal Gear Pump** - with bypass for processing pressurized and non-pressurized vessels

 Part of the Schroeder Industries 2030 Initiative

The Schroeder Pro: Total Fluid Life is a state-of-the-art portable service unit, designed to provide invaluable, real-time insight into the health of synthetic oils, organic oils, mineral oils, and diesel fuel. This insight helps fluid users make informed decisions with regard to fluid replacement and treatment planning.

## Features & Benefits

## Description

## Specifications

<b>Measured Variables:</b>	ISO Code / SAE Class / NAS Class / TAN-Delta Number (Oil Life) / Saturation Level / Temperature
<b>Particulate Measurement Standards:</b>	ISO 4406 (≥4(c) / ≥6(c) / ≥14(c) / ≥21(c)), NAS 1638, SAE AS4059
<b>Particle Counter Measuring Range:</b>	Maximum ISO Code of 29
<b>Accuracy:</b>	±0.5 ISO Code (Minimum concentration ISO MTD 2.8mg/L)
<b>Operating Temperature Range:</b>	32°F to 122°F
<b>Fluid Compatibility:</b>	Mineral-based oils, Synthetic oils, Organic oils, Diesel Fuels
<b>Dimensions (cover closed):</b>	-(L) 16.2" x (D) 12.7" x (H) 6.7" (main device; accessory case: (L) 22.6" x (D) 20.9" x (H) 8.0")
<b>Environmental Protection:</b>	IP67 (cover closed) IP54 (cover open)
<b>Maximum Ambient Humidity:</b>	97% relative humidity, non-condensing
<b>Weight:</b>	20.8 lbs. (9.45kg) (main device; accessory case: 19lbs. [8.6kg])
<b>Calibration Verification Frequency:</b>	12 months recommended
<b>Operating Pressure:</b>	36.3 psi (2.5 bar) Max. (5075 psi [350 bar] w/ adapter for pressurized lines)
<b>System Pressure:</b>	145 psi (10 bar) Max.
<b>Permissible Viscosity Range:</b>	1-320 cSt (1-300 cSt with high pressure adapter)
<b>Operating Temperature:</b>	32°F to 122°F
<b>Fluid Temperature Range:</b>	14°F to 131°F (oils) 14°F to 122°F (diesel fuel)
<b>Pump Type:</b>	Gear
<b>Duty Cycle:</b>	Continuous
<b>Connection:</b>	1604 minimes test points, with 0.6m long 8mm tubing
<b>Power Supply Voltage:</b>	115V AC
<b>Nominal Battery Voltage:</b>	15.0V DC
<b>Charge Voltage:</b>	16.8V DC
<b>Charge Capacity:</b>	5.2Ah
<b>Charge Time:</b>	2 hours (80%) / 5 hours (100%)
<b>Run Time:</b>	Up to 6 hours (viscosity dependent)
<b>Data Transmission:</b>	Internet, USB

- CS 1000
- CS 1939
- CSI-C-11
- HY-TRAX®
- RBSA
- CSM
- TFL**
- TFH
- FCU
- MCS
- AS
- SMU
- CTU
- EPK
- Trouble Check Plus
- HMG2500
- HMG4000
- ET-100-6
- HTB
- RFSA
- HFS-BC
- HFS-15
- MFD-BC
- MFS, MFD
- HY-TRAX® Retrofit System
- MFD-MV
- MFS-HV
- AMS, AMD
- FS
- AMFS
- KLS, KLD
- MCO
- AKS, AKD
- LSN, LSA, LSW
- X Series
- OLF Compact
- OLF
- OLF-P
- NxTM
- VEU
- IXU
- Triton-A
- Triton-E
- NAV
- SVD01
- SVD
- OX5
- Appendix

Model  
SelectionSchroeder Pro Series:  
Total Fluid Life

7641077

Schroeder Pro Series:  
Accessory Kit*Included w/ Schroeder Pro*Schroeder Pro Series: High  
Pressure Adapter  
*Sold Separately*

7641529

Items  
Supplied

- Schroeder Pro: Total Fluid Life  
**Accessory Kit with included items:**
- 120VAC Power Supply (charger)
  - Hotplate
  - Temperature probe
  - Magnetic stirrer
  - 100 mm wide funnel
  - (2) 100 mL sampling bottles
  - Sampling/vacuum pump
  - USB memory stick
  - (2) stoppers (8mm hole)
  - Viscosity cup
  - High-pressure device
  - (2) solid stoppers
  - (2) 500 mL flasks
  - Storage compartment for hoses and cables

# Schroeder Pro Total Fluid Health

# TFH



**Laser Particle Counter** - 4, 6, 14, & 21 micron counts displayed as ISO, NAS, & SAE



**Oil Life Sensor** - gives warning of oil life ending and also helps inform if an oil change is required



**Water Sensor** - shows relative humidity of oil as % saturation



**Touch Screen** - allows users to navigate operational functions with ease and analyze data



**Internal Gear Pump** - with bypass for processing pressurized and non-pressurized vessels



**Digital Imaging** - sensor sorts particles into fatigue, cutting, sliding wear, and fiber categories to estimate cause of contamination

Part of the Schroeder Industries 2030 Initiative

The Schroeder Pro: Total Fluid Health is a revolutionary portable service unit, designed to measure and differentiate particulate contamination, as well as determine oil life, relative water content, and temperature. This real-time insight into the health of synthetic, organic, and mineral oils, as well as diesel fuel, helps users make informed decisions with regard to fluid replacement and treatment planning.

<b>Measured Variables:</b>	Particle Differentiation / ISO Code / SAE Class / NAS Class / TAN-Delta Number (Oil Life) / Saturation Level / Temperature
<b>Particulate Measurement Standards:</b>	ISO 4406 (≥4(c) / ≥6(c) / ≥14(c) / ≥21(c) / ≥38(c) / ≥70(c) / ≥100(c)) , NAS 1638, SAE AS4059
<b>Particle Counter Measuring Range:</b>	Maximum ISO Code of 29
<b>Accuracy:</b>	±0.5 ISO Code (Minimum concentration ISO MTD 2.8mg/L)
<b>Operating Temperature Range:</b>	32°F to 122°F
<b>Fluid Compatibility:</b>	Mineral-based oils, Synthetic oils, Organic oils, Diesel Fuels
<b>Dimensions (cover closed):</b>	(L) 16.2" x (D) 12.7" x (H) 6.7" (main device; accessory case: (L) 22.6" x (D) 20.9" x (H) 8.0")
<b>Environmental Protection:</b>	IP67 (cover closed) IP54 (cover open)
<b>Maximum Ambient Humidity:</b>	97% relative humidity, non-condensing
<b>Weight:</b>	26.5 lbs. (12.0kg) (main device; accessory case: 19lbs. [8.6kg])
<b>Calibration Verification Frequency:</b>	12 months recommended
<b>Inlet Pressure:</b>	36.3 psi (2.5 bar) Max. (5075 psi [350 bar] w/ adapter for pressurized lines)
<b>System Pressure:</b>	145 psi (10 bar) Max.
<b>Permissible Viscosity Range:</b>	1-2400cSt (1-300 cSt with high pressure adapter)
<b>Operating Temperature:</b>	32°F to 122°F
<b>Fluid Temperature Range:</b>	14°F to 131°F (oils) 14°F to 122°F (diesel fuel)
<b>Pump Type:</b>	Gear
<b>Duty Cycle:</b>	Continuous
<b>Connection:</b>	1604 minimes test points, with 0.6m long 8mm tubing
<b>Power Supply Voltage:</b>	115V AC
<b>Nominal Battery Voltage:</b>	15.0V DC
<b>Charge Voltage:</b>	16.8V DC
<b>Charge Capacity:</b>	5.2Ah
<b>Charge Time:</b>	2 hours (80%) / 5 hours (100%)
<b>Run Time:</b>	Up to 6 hours (viscosity dependent)
<b>Data Transmission:</b>	Internet, USB

## Features & Benefits

CS 1000  
CS 1939  
CSI-C-11  
HY-TRAX®  
RBSA  
CSM  
TFL  
TFH  
FCU  
MCS  
AS  
SMU  
CTU  
EPK  
Trouble  
Check Plus

## Description

HMG2500  
HMG4000  
ET-100-6  
HTB

## Specifications

RFSA  
HFS-BC  
HFS-15  
MFD-BC  
MFS, MFD  
HY-TRAX®  
Retrofit System  
MFD-MV  
MFS-HV  
AMS, AMD  
FS  
AMFS  
KLS, KLD  
MCO  
AKS, AKD  
LSN, LSA, LSW  
X Series  
OLF Compact

OLF  
OLF-P  
NxTM  
VEU  
IXU  
Triton-A  
Triton-E  
NAV  
SVD01  
SVD  
OX5

Appendix

Model  
SelectionSchroeder Pro Series:  
Total Fluid Health

7641078

Schroeder Pro Series:  
Accessory Kit*Included w/ Schroeder Pro*Schroeder Pro Series: High  
Pressure Adapter  
*Sold Separately*

7641529

Items  
Supplied

- Schroeder Pro: Total Fluid Life  
**Accessory Kit with included items:**
- 120VAC Power Supply (charger)
  - Hotplate
  - Temperature probe
  - Magnetic stirrer
  - 100 mm wide funnel
  - (2) 100 mL sampling bottles
  - Sampling/vacuum pump
  - USB memory stick
  - (2) stoppers (8mm hole)
  - Viscosity cup
  - High-pressure device
  - (2) solid stoppers
  - (2) 500 mL flasks
  - Storage compartment for hoses and cables

# Fluid Control Units - Portable Models

**FCU**

Formally Known as "TMU - TestMate® Monitoring Unit"

## Features and Benefits

- Two contamination calibrations in one instrument (reversible)
- ISO 4406:1987; NAS 1638
- ISO 4406:1999; SAE AS 4059(D)
- Saturation and temperature measurement through the built-in AquaSensor (AS 1000)
- Integrated pump for measurement in pressureless reservoirs
- Operation with 24 VDC network adaptor included in scope of delivery
- Data storage capabilities
- Interfaces: 5-pole plug, Bluetooth, USB data port



 Part of the Schroeder Industries 2030 Initiative

The FCU1310 combines the advantages of the portable contamination measurement units with the measurement technology of the Contamination Sensor (CS 1000) and AS 1000 Aqua Sensor.

The FCU is a portable service unit and is designed for measurement of solid particle contamination and water saturation in hydraulic systems. It is designed for temporary operation up to a maximum of 30 minute runtime followed by a rest period of 10 minutes and is not intended for continuous operation.

The FCU will measure contamination levels on mineral based hydraulic oils compatible with Viton® seals. The FCU is not compatible with water glycol fluids.

The integrated pump and the hoses with test point connections, which are included with the FCU, allow operation on pressureless reservoirs, control circuits, and high pressure circuits.



- Usable with FluMos Mobile App
- Download and store measured data in real-time using FluMos Mobile App via Bluetooth connection

CS 1000  
CS 1939  
CSI-C-11  
HY-TRAX®  
RBSA  
CSM  
TFL  
TFH  
FCU  
MCS  
AS  
SMU  
CTU  
EPK  
Trouble  
Check Plus

## Description

HMG2500  
HMG4000  
ET-100-6  
HTB  
RFSA  
HFS-BC  
HFS-15  
MFD-BC  
MFS, MFD  
HY-TRAX®  
Retrofit System

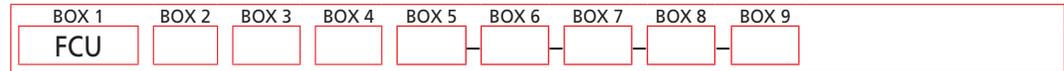
## Specifications

<b>General Data:</b>	<b>Self-Diagnosis:</b>	Continuously with error indication via status LED and display
	<b>Measured Value:</b>	ISO code / SAE Class / NAS Class / Saturation level / Temperature
	<b>Measuring Range:</b>	Display from ISO code 9/8/7 (MIN) to ISO code 25/24/23 (MAX) Calibrated within the range ISO 13/11/10 to 23/21/18 Saturation level 0 to 100 % / Temperature -13°F to 212°F (-25°C to 100°C)
	<b>Accuracy:</b>	± 1/2 ISO class in the calibrated range / ± 2 % Full scale max.
	<b>Material of Sealings:</b>	FPM Viton seals
	<b>Ambient Temperature Range:</b>	32°F to 113°F (0°C to 45°C)
	<b>Storage Temperature Range:</b>	-40°F to 176°F (-40°C to +80°C)
	<b>Dimensions (cover closed):</b>	9" H x 16" L x 13"D
	<b>IP Class:</b>	IP50 in operation IP67 closed
	<b>Weight:</b>	Approx. 29 lbs (13 kg)
<b>Hydraulic Data:</b>	<b>Operating Pressure:</b>	IN: -7.25 to 650 psi (-0.5 to 45 bar) OUT: 0 to 7.5 psi (0 to 0.5 bar)
	<b>with Adapter for Pressure Lines:</b>	IN: 217 to 5000 psi (15 to 345 bar) OUT: 0 to 7.5 psi (0 to 0.5 bar)
	<b>Pressure Max.:</b>	5000 psi (345 bar) (using included high pressure adapter)
	<b>Maximum Suction Height:</b>	39 in (1 m)
	<b>Permissible Viscosity Range:</b>	46 to 1622 SUS (10 to 350 cSt)
	<b>Fluid Temperature Range:</b>	32°F to 158°F (0°C to +70°C)
<b>Electrical Data:</b>	<b>Power Supply Voltage:</b>	24 VDC ± 20%, residual ripple < 10%
	<b>Max. Power / Current Consumption:</b>	100 Watt / 4 A
	<b>Interface:</b>	Plug connection, 5-pole, male, M12x1 and USB

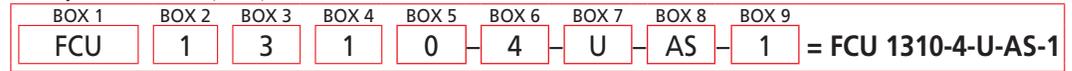
MFD-MV  
MFS-HV  
AMS, AMD  
FS  
AMFS  
KLS, KLD  
MCO  
AKS, AKD  
LSN, LSA, LSW  
X Series  
OLF Compact  
OLF  
OLF-P  
NxTM  
VEU  
IXU  
Triton-A  
Triton-E  
NAV  
SVD01  
SVD  
OX5  
Appendix

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder FCU:



**Example:** NOTE: One option per box



BOX 1	BOX 2	BOX 3
<b>Series</b>	<b>Model</b>	<b>Contamination Code</b>
FCU = Fluid Control Unit	1000 Series, 1 = 4 particle size channelst	ISO 4406: 1987 NAS 1638 > 2 µm > 5 µm > 15 µm > 25 µm 3 = ISO 4406: 1999 SAE AS 4059(D) > 4 µm(c) > 6 µm(c) > 14 µm(c) > 21 µm(c)

BOX 4	BOX 5	BOX 6	BOX 7
<b>Housing</b>	<b>Fluids</b>	<b>Options</b>	<b>Supply Voltage</b>
1 = for Hydraulic and lubrication fluids based on mineral oils Hydraulic and lubrication 5 = fluids based on mineral oils as well as diesel	Mineral Oil, Synthetic Esters/PAO, Quintolubric, Cosmolubric (Consult factory for other fluid types.) 0 =	4 = with Integrated Pump	U = 24 V DC

BOX 8	BOX 9
<b>Integrated</b>	<b>Power Supply Adapter</b>
AS = AquaSensor (AS 1000 series)	100 to 240 V AC / 50/60 1 = Hz / 1 Phase, (Europe, USA, Canada, UK, Australia, Japan)

We do not guarantee the accuracy or completeness of this information. The information is based on average working conditions. For exceptional operating conditions, please contact our technical department. All details are subject to technical changes.

#### Items supplied with FCU-1310-4-U-AS-1 include:

- Fluid control Unit FCU 1000
- Power supply AC adapter with connecting cables to supply voltage for Europe, USA/Canada, UK, Australia, & Japan
- Adapter for pressure lines
- Inlet pressure hose with screw connection for 1620 test point, length = 2 meters (approx. 79 inches) in length
- Inlet suction hose, clear, open end, length = 0.3 meters (approx. 12 inches) in length
- Outlet return hose, open end, clear, length 1 meter (approx. 39 inches) in length
- Operation Manual & Calibration Certificate FluMoS Software
- USB Flash Drive

#### Accessories:

- Battery Pack (approx. 5 hours of use) Part No. 3504605

# Metallic Contamination Sensor Series



Formally Known as "TMS Metallic Contamination Sensor Series"



## Features and Benefits

- Early detection of imminent gear unit damage
- Prevention of expensive plant downtime
- Optimal supplement to optical sensors
- Measurement of metallic particles (ferromagnetic and nonferromagnetic) > 70 µm
- Measurement result is not affected by air bubbles or liquid contamination in the liquid

## Applications

- Gear boxes for wind energy
- Paper machine bearings
- Wind Turbines
- Marine Thrusters
- Industrial Gear Boxes
- Mobile Drive Systems
- Lubricating Systems
- Flushing Systems
- Test Standards
- Pumps

The Metallic Contamination Sensor MCS 1000 is used for measuring and recording metallic wear particles in fluids. An inductive measuring method is used to detect and count the particles and classify them according to their size and metallurgical properties (ferromagnetic/non-ferromagnetic). The MCS 1000 is therefore an ideal tool for the continuous condition monitoring of large industrial gearboxes, pumps or bearing systems, and provides early information on any early-stage damage.

The sensor can be used on its own or in combination with other condition monitoring devices such as vibration monitoring systems.

The MCS 1000 can therefore be easily integrated into condition-based or predictive maintenance approaches and it also helps to prevent unscheduled system downtimes.

Technical Details	MCS 15xx	MCS 14xx	MCS 13xx
Flow Rate	2.6... 52.8 gpm (10... 200 l/min)	0.5... 10.6 gpm (2... 40 l/min)	0.1... 2.1 gpm (0.4... 8 l/min)
Sensor Orifice Diameter	1" (25.4 mm)	1/2" (12.7 mm)	1/4" (6.3 mm)
Ferromagnetic (Fe) particles	> 200 µm	> 100 µm	> 70 µm
	Particle with volume equivalent to that of a sphere with given Ø		
Non-ferromagnetic (nFe) particles	> 550 µm	> 300 µm	> 200 µm
	Particle with volume equivalent to that of a sphere with given Ø		
Max. Particle Rate (particles/sec.; proportional to flow rate)	8 to 160	9 to 180	0 to 200



- Compatible with FluMoS Mobile App when connected to the CSI-C-11

## Description

## Comparison

**CSI-C-11  
Compatible  
Product**

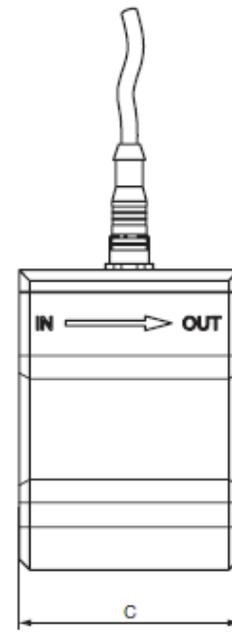
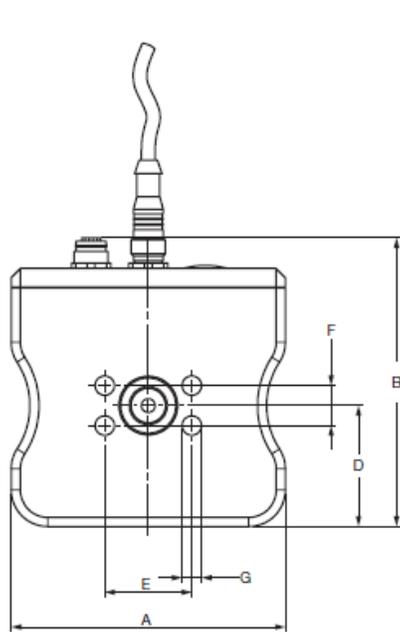
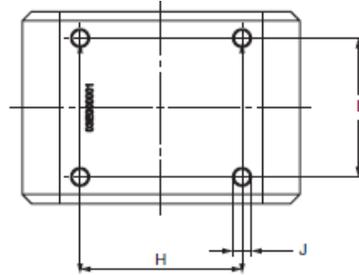
- CS 1000
- CS 1939
- CSI-C-11
- HY-TRAX®
- RBSA
- CSM
- TFL
- TFH
- FCU
- MCS**
- AS
- SMU
- CTU
- EPK
- Trouble Check Plus
- HMG2500
- HMG4000
- ET-100-6
- HTB
- RFSA
- HFS-BC
- HFS-15
- MFD-BC
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- HY-TRAX® Retrofit System
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- MFS-HV
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- FS
- AMFS
- KLS, KLD
- MCO
- AKS, AKD
- LSN, LSA, LSW
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- OLF
- OLF-P
- NxTM
- VEU
- IXU
- Triton-A
- Triton-E
- NAV
- SVD01
- SVD
- OXS
- Appendix

Formally Known as "TMS Metallic Contamination Sensor Series"

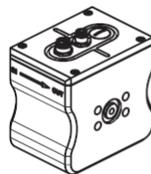
## Dimensions

Metric dimensions in ( ).

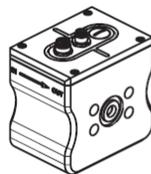
Type	A	B	C	D	E	F	G	H	I	J
13XX-X-1	120	113	83	53	38.1	17.5	∅8	70	60	M8
14XX-X-2	120	113	83	53	47.6	22.2	∅11.5	70	60	M8
15XX-X-3	162	106	83	38.5	52.4	26.2	∅11.5	80	55	M8
15XX-X-5	162	132	83	62	130	77.8	∅17.5	95	60	M8
15XX-X-6	120	106	83	38.5	69.9	35.7	∅13.5	90	35	M8



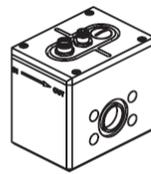
MCS13XX-X-1



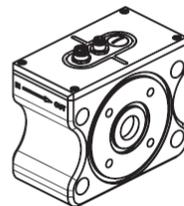
MCS14XX-X-2



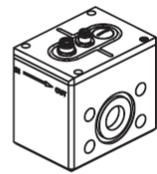
MCS15XX-X-3



MCS15XX-X-5



MCS15XX-X-6



# Metallic Contamination Sensor Series



Formally Known as "TMS Metallic Contamination Sensor Series"

<b>General Data:</b>	Ambient Temperature:	-40°F to 158°F (-40°C to +70°C)
	Diameter Sensor Cross-section:	MCS 13xx: 1/4" (6mm) MCS 14xx: 1/2" (13mm) MCS 15xx: 1" (25mm)
	Protection Class to DIN 40050:	IP 67
	Weight:	MCS 13xx: ~6.6 lbs (~3kg) MCS 14xx: ~5.6 lbs (~2.5kg) MCS 15xx: ~7.7 lbs (~3.5kg)
	Environmental Tests:	Vibration test / Shock test: EN60068-2-2 / -2-64 (vibration) EN60068-2-27 / -2-31 (shock) Climate test: EN60068-2-52 (salt mist) EN60068-2-1 / -2-2 / -2-14 / -2-30 / -2-38 / 2-78 (temperature and humidity)
	Certifications:	Wind power: DNV - Renewables Cert. Marine: DNV - Type Approval
	Self Diagnostics:	Continuous, with error indication via Status LED and general operational readiness via Device-Ready-LED EN61000-6-4 / -6-2 / -6-9 CE Mark: (pulse magnetic field immunity) / -4-29 (voltage dips) FCC Mark: FCC – Title 47 CFR Part 15
<b>Hydraulic Data:</b>	Flow Rate:	MCS 13xx: 0.1-2.1 gpm (0.4-8 l/min) MCS 14xx: 0.5-10.6 gpm (2-40 l/min) MCS 15xx: 2.6-52.8 gpm (10-200 l/min)
	Operating Pressure:	290 psi (20 bar)
	Fluid Temperature Range:	-40°F to 185°F (-40°C to +85°C)
	Inlet/Outlet (flange connection according to ISO 6162-1):	MCS 13xx: SAE 1/2" MCS 14xx: SAE 3/4" MCS 15xx: SAE 1", SAE 1-1/2", SAE 2", SAE 4"
	Permissible Fluids:	Hydraulic and lubrication fluids based on mineral oils as well as synthetic oils (e.g. poly- $\alpha$ -olefins – PAO)
<b>External Electrical Data:</b>	Supply Voltage:	18 - 36 VDC, residual ripple < 10%
	Power Consumption:	5 W max.
<b>Internal Electrical Data:</b>	2 Configurable:	1 x Ferromagnetic particles (Fe)
	Switching:	1 x Non-ferromagnetic particles (nFe)
	Outputs:	OR
	(active, normally-open):	1 x Ferromagnetic particles (Fe) + Non-ferromagnetic particles (nFe) 1 x Status Signal
		OR 1x Alarm signal 1x Status signal
	Alarm Relays Capacity:	1.5 A max.
	RS485 Interface:	Physical: 2 wire, half duplex; Protocol: HSI, Modbus RTU
	HSI Interface (proprietary protocol):	Physical: 1 wire, half duplex; Protocols: HSI
	Switching Log:	Active Low or Active High (adjustable)
	Length of Switching Pulse of Particle Signal:	Adjustable, 5 to 200 ms
Length of Switching Pulse of Alarm Output:	Adjustable, 30 to 86, 400 s, or continuously on to Reset	
Ethernet Interface:	Physical: 10Base-T / 100Base-TX Protocols: HSI TCP/IP, Modbus TCP	
CAN Interface:	Physical: CAN; Protocol: CANopen	
USB Interface (only for service)	Physical: mini USB; Protocol: propr	

## Specifications

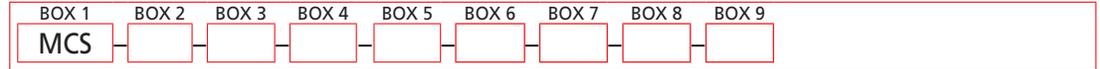
CS 1000
CS 1939
CSI-C-11
HY-TRAX®
RBSA
CSM
TFL
TFH
FCU
<b>MCS</b>
AS
SMU
CTU
EPK
Trouble Check Plus
HMG2500
HMG4000
ET-100-6
HTB
RFSA
HFS-BC
HFS-15
MFD-BC
MFS, MFD
HY-TRAX® Retrofit System
MFD-MV
MFS-HV
AMS, AMD
FS
AMFS
KLS, KLD
MCO
AKS, AKD
LSN, LSA, LSW
X Series
OLF Compact
OLF
OLF-P
NxTM
VEU
IXU
Triton-A
Triton-E
NAV
SVD01
SVD
OXS
Appendix

We do not guarantee the accuracy or completeness of this information. The information is based on average working conditions. For exceptional operating conditions please contact our technical department. All details are subject to technical changes.

Formally Known as "TMS Metallic Contamination Sensor Series"

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder MCS:



**Example:** NOTE: One option per box



BOX 1	BOX 2	BOX 3	BOX 4
<b>Series</b>	<b>Model</b>	<b>Detection Limit/ Sensor Cross-Section</b>	<b>Options</b>
Metallic MCS = Contamination Sensor	1 = 1000 Series	3 = Fe particles > 70 µm / 1/4" 4 = Fe particles > 100 µm / 1/2" 5 = Fe particles > 200 µm / 1"	2x switching output / RS485 8 = (HSI, Modbus RTU) / Ethernet (HSI TCP/IP, Modbus TCP) 2x switching output / CAN 9 = (CANopen) / Ethernet (HSI TCP/IP, Modbus TCP)

BOX 5	BOX 6	BOX 7
<b>Signal Input/ Electrical Interface</b>	<b>Fluids</b>	<b>Hydraulic Connections</b>
0 = Without	0 = Mineral and synthetic oils	1 = Flange Connection, SAE 1/2" ISO 6162-1 (only for MSC13xx) 2 = Flange Connection, SAE 3/4" ISO 6162-1 (only for MCS14xx) 5 = Flange Connection, SAE 4" ISO 6162-1 (only for MCS15xx)

BOX 8	BOX 9
<b>Electrical Installation</b>	<b>Modification Number</b>
M12x1 male connection, 8-pin / Ethernet 2 = M12x1, 4-pin, D encoded according to IEC61076-2-101 / mini USB	000 = Standard

## Scope of Delivery

- Sensor MCS 1000 Series
- O-rings (NBR and FPM)
- Installation and Maintenance Instructions

## Hydraulic Accessories

Flange Adapter	Part No.
SAE 4" flange adapters (set) to pipe/hose connection, 42L according to ISO 8431-1 consisting of: - 2x Flange adapters - 2x O-Rings (NBR) - 8x Cheese-head screws - 8x Washers - 8x Spring washers"	3435426
SAE 1/2" Flange adapters (set) to pipe/hose connection, 1/2" according to ISO 8431-1 consisting of: - 2x Flange adapters - 2x O-Rings (NBR) - 8x Cheese-head screws"	3788271
SAE 3/4" Flange adapters (set) for pipe/hose connection, 1/2" according to ISO 8431-1 consisting of: - 2x Flange adapters - 2x O-Rings (NBR) - 8x Cheese-head screws"	3588249
Flange adapter plate, SAE 4" – SAE 1 1/2"	3442518

Formally Known as "TestMate® Water Sensor"

## Features and Benefits

- Compatible with hydraulic, lube oils and synthetic and natural esters
- Measures and displays saturation and temperature continuously in real-time
- Measured in saturation percentage, not ppm. This is preferable since it takes into account temperature and viscosity variations (see desired saturation level below)
- Data can be monitored to PC, PLC, etc.
- No calibration necessary for different oils
- Individual configuration (AS 3000 only)
- Flumos Mobile App compatibility (AS 1000 only)

## Applications

- Hydraulic systems that are sensitive to water in oil
- Gear boxes
- Injection molding machines
- Turbines
- Transformers
- Mobile Hydraulics
- OEM

The AS sensors are online saturation and temperature sensors for the monitoring of hydraulic and lubrication fluids accurately and continuously. They measure the water content relative to the saturation concentration (saturation point) and outputs the degree of saturation (saturation level) in the range of 0 to 100% as a 4 to 20 mA signal. A reading of 0% would indicate the absence of water, while a reading of 100% would indicate that a fluid is free water. An integrated thermoelement on the sensor measures the temperature of the fluid in the range of -13°F to 212°F (-25°C to 100°C) and outputs it as a 4 to 20 mA signal.

The AS 3000 has a 4-digit, digital display that shows real-time measured values and allows for parameter adjustments. The digital display may also be rotated/aligned on two axes.

Since the effects of free and emulsified water are more harmful than those of dissolved water, water levels should remain well below the saturation point. However, even water in solution can cause damage and therefore every reasonable effort should be made to keep saturation levels as low as possible. As a guideline, we recommend maintaining saturation levels below 30% in all equipment.

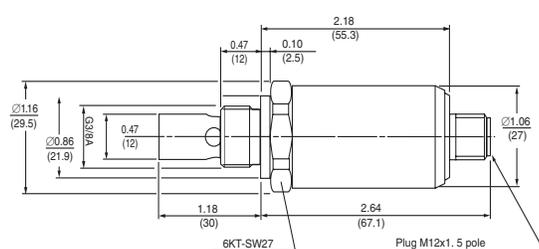
If you have any questions regarding technical details or the suitability of the AS sensors for your application, please contact our sales/technical department.



- Only the AS 1000 is Usable with FluMoS Mobile App when connected to the CSI-C-11.

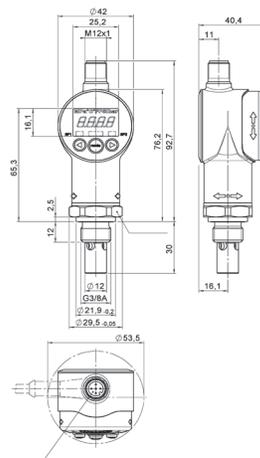


AS 1000



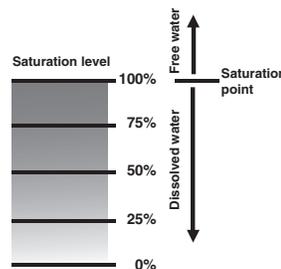
Metric dimensions in ( ).

AS 3000



## Description

## Desired Saturation Level



- CS 1000
- CS 1939
- CSI-C-11
- HY-TRAX®
- RBSA
- CSM
- TFL
- TFH
- FCU
- MCS
- AS
- SMU
- CTU
- EPK
- Trouble Check Plus
- HMG2500
- HMG4000
- ET-100-6
- HTB
- RFSA
- HFS-BC
- HFS-15
- MFD-BC
- MFS, MFD
- HY-TRAX® Retrofit System
- MFD-MV
- MFS-HV
- AMS, AMD
- FS
- AMFS
- KLS, KLD
- MCO
- AKS, AKD
- LSN, LSA, LSW
- X Series
- OLF Compact
- OLF
- OLF-P
- NxTM
- VEU
- IXU
- Triton-A
- Triton-E
- NAV
- SVD01
- SVD
- OXS
- Appendix

Formally Known as "TestMate® Water Sensor"

## Specifications

<b>Input Data</b>	Measuring Range:	0 to 100% Saturation; -13°F to 212°F (25°C to 100°C)	
	Operating Pressure:	-7.25 to 725 psi max (-0.5 to 50 bar)	
	Burst Pressure:	9135 psi (630 bar) max	
	Parts in Contact with Media:	Connection Point: Stainless Steel/Ceramic with vacuum-metalized metal Seal: Viton = Mineral Oils/Esters, EPDM = Skydrol	
<b>Output Data</b>	<b>Humidity Measurement:</b>		
	Output Signal (saturation level):	4 to 20 mA	
	Calibrated Accuracy:	≤ ± 2% FS max	
	Accuracy in Media Measurements:	≤ ± 3% FS typ.	
<b>Output Data</b>	<b>Temperature Measurement:</b>		
	Output Signal (temperature):	4 to 20 mA	
	Accuracy:	± 2% FS max	
	<b>Ambient Conditions</b>	Nominal Temperature Range (saturation level measuring):	<b>AS 1000</b> 32°F to 194°F (0°C to 90°C)
Ambient Temperature Range:		-40°F to 212°F (-40°C to 100°C)	-40°F to 176°F (-40°C to 80°C)
Viscosity Range:		32 to 23,175 SUS (1 to 5000 cSt)	
Flow Velocity:		< 16 ft/s	Maximum 16 ft/s
Media Tolerance:		Mineral oil-based fluids, natural and synthetic esters	
CE Mark:		EN 50081-1, EN 50081-2, EN 50082-1, EN 61000-6-1-1/2/3/4	
Type of Protection acc. DIN 40050:		IP 67	
<b>Other Data</b>		Supply Voltage:	12 to 32 VDC
	Residual Ripple Supply Voltage:	≤5%	
	Mechanical Connection:	G3/8A DIN 3852	
	Torque Rating:	18.5 ft-lbs	
	Electrical Connection:	M12x1, 5 pole (DIN VDE 0627)	Supply voltage: 18-35 VDC
	Pin 1:	+Ub	Analog output
	Pin 2:	Signal saturation level	GND
	Pin 3:	0V / GND	SP1 (alarm)
	Pin 4:	Signal temperature	SP2 (warning)
	Pin 5:	HSI Interface: 1 wire, half duplex	

FS (Full Scale) relative to the full measuring range

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder AS:



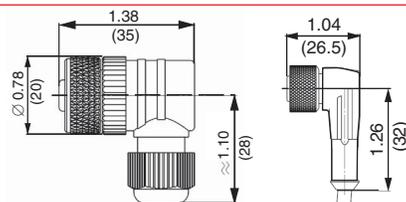
**Example:** NOTE: One option per box



BOX 1	BOX 2	BOX 3	BOX 4
<b>Model</b>	<b>Sensor Types</b>	<b>Type of Medium</b>	<b>Signal Technology</b>
AS	1 = No Display 3 = Digital Display	008 = Mineral Oil 108 = Phosphate Ester	5 = 2 Switch outputs/1 analog output *AS 3000 ONLY OPTION* Output 1 Pin 2 saturation level (4 .. 20 mA) C = Output 2 Pin 4 temperature (4 .. 20 mA) *AS 1000 ONLY OPTION*

## Accessories

Part Number	Description	Color Code
6006791	(5 pole) with 5m cable	Pin 1: Brown
7608409	(5 pole) with 5m screened cable	Pin 2: White
6023102	(5 pole) with 10m screened cable	Pin 3: Blue
		Pin 4: Black
		Pin 5: Grey



# Sensor Monitoring Unit

# SMU

CS 1000

CS 1939

CSI-C-11

HY-TRAX®

RBSA

CSM

TFL

TFH

FCU

MCS

AS

**SMU**

CTU

EPK

Trouble  
Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSA

HFS-BC

HFS-15

MFD-BC

MFS, MFD

HY-TRAX®  
Retrofit System

MFD-MV

MFS-HV

AMS, AMD

FS

AMFS

KLS, KLD

MCO

AKS, AKD

LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

SVD

OXS

Appendix

## Features and Benefits

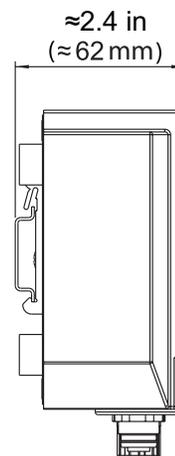
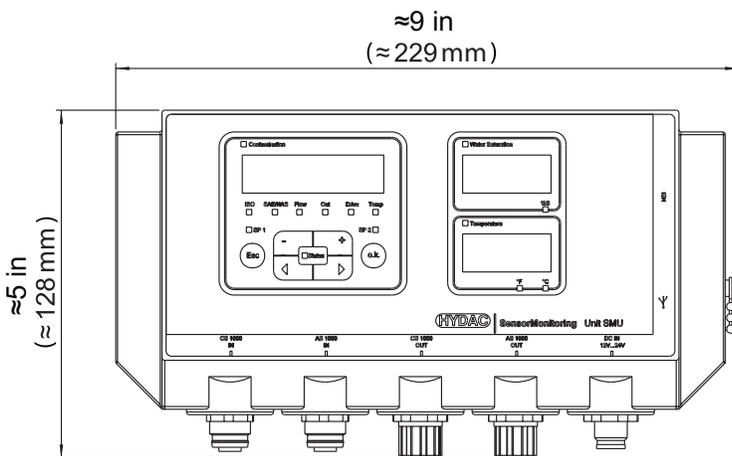
- Simple installation parallel to the customer system (Sensor Interface for SMU1200, transfer of the sensor's own analog and switching outputs) using the magnetic holder or top hat rails.
- High protection class IP67. Installation in a switch cabinet is not necessary
- Plug & Work unit including the 5m connection cable required for direct connection of the sensors (sensor connections via M12x1 male connectors, no programming necessary).
- Simple keypad operation.



- Usable with FluMoS Mobile App
- Download and store measured data in real-time using FluMoS Mobile App via Bluetooth connection

The Sensor Monitoring Unit SMU1200 is a display unit for fluid sensors and is designed to display and store measured data. The following combinations of fluid sensors can be connected directly:

- Contamination Sensor TCM and water sensor TWS-C
- Metallic Contamination Sensor TMS and water sensor TWS-C



Metric dimensions in ( ).

## Description

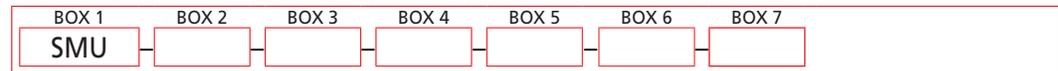
## Specifications

Ambient Temperature:	32°F to 131°F (0°C to +55°C)
Self diagnostics:	Continuously with error indication on display
Display:	LED, 6/4/4-digit, each with 17 segments
Topple (according to IEC/EN 60068-2-31):	Drop height 1 in.
Storage temperature range:	-40°F to 176°F (-40 °C to +80°C)
Relative humidity:	Maximum 95%, non-condensing
Weight:	2 lbs.
<b>Electrical data:</b>	Supply voltage: 12 ... 24 V DC (±10%) The SMU must not be used with vehicle supply systems without load dump protection of maximum 30 V DC.
Residual ripple:	≤ 5 %
Power consumption:	15 Watt, 1.25 A max.
Accuracy of the real-time clock:	± 5 s/day / ± 0.5 h/year
Clock buffer:	≈ 20 years
Protection rating:	III (safety extra-low voltage)
Protection class:	IP 67
USB Master port:	USB Type A
HSI:	1-wire half duplex
Ethernet interface:	10 Base-T / 100 Base-Tx

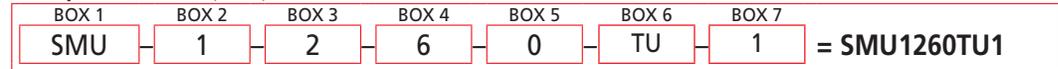
We do not guarantee the accuracy or completeness of this information. The information is based on average working conditions. For exceptional operating conditions please contact our technical department. All details are subject to technical changes.

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder SMU:



**Example:** NOTE: One option per box



BOX 1	BOX 2	BOX 3	BOX 4	BOX 5
Model	Model	Data Input	Interface	Application
SMU	1 = 1000 Series	2 = Digital	6 = HSI + USB Master	0 = Standard

BOX 6	BOX 7
Supply Voltage	Data Input
TU = 12 to 24V DC	1 = TCM & TWS-C 2 = TMS & TWS-C

## What's Included

- 1 SMU 1200 series
- 1 USB memory stick
- 1 connection cable 5 pole with flying leads for power supply, L = 5m
- 2 connection cables appropriate for the sensor combination, L = 5m
- 1 FluMoS Light CD
- 1 Operating manual
- DIN rail, 7.5" long.

## Available Accessories

- Power supply PS5, 100-240 V AC / 50-60 Hz / 1.1 A 24 V DC / 1000 mA, Cable length = 1.8 m, Part no.: 3399939

# TestMate® Contamination Test Unit

**CTU**

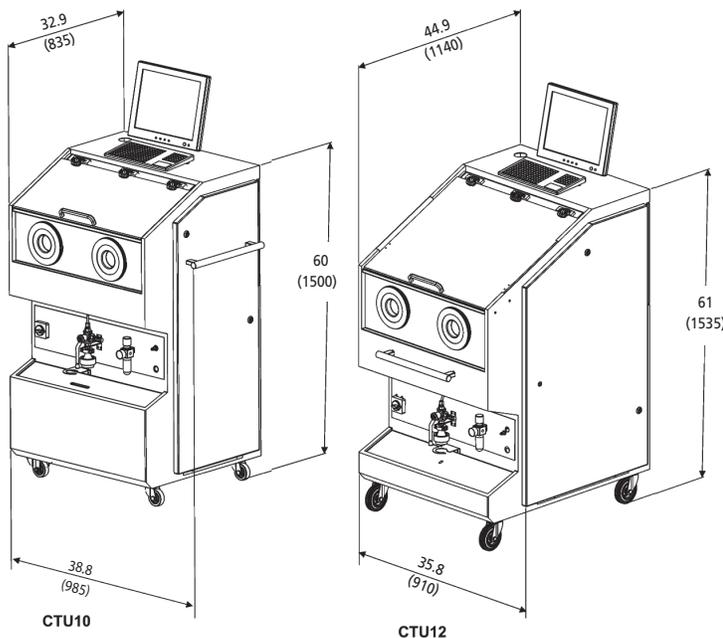
## Features and Benefits

- Cost reduction through lower production failure rates
- Identification and elimination of weak process steps
- Optimization of both internal and external handling processes
- Establishing of cleanliness standards, both internal and external
- Documentation of component cleanliness
- Survey of fluid cleanliness and filtration concepts



The Cleanliness Test Unit (CTU 1000) is designed to determine the technical cleanliness especially present on minor contaminated components. By determining the type, size and quantity of the contamination, quality standards can be checked and documented and the necessary steps towards optimization can be taken.

## Description



Metric dimensions in ( ).

<b>Overall Dimensions (H x W x L):</b>	CTU10xx 71 in x 39 in x 35 in (1800 mm x 985 mm x 835 mm) CTU12xx 71 in x 36 in x 45 in (1800 mm x 910 mm x 1140 mm)
<b>Weight:</b>	CTU10xx: ≈ 595 lbs (270 kg) ≈ 640 lbs (290 kg) <i>with ultrasonic unit</i> CTU12xx: ≈ 685 lbs (310 kg) ≈ 728 lbs (330 kg) <i>with ultrasonic unit</i>
<b>Mounting:</b>	Mobile (mounted on casters)
<b>Power Consumption:</b>	600 W (800 W with ultrasonic)
<b>Ambient Temperature:</b>	59°F to 82°F (15°C to 28°C)
<b>Cleanroom module</b>	<b>Material of Cleanroom:</b> Polished stainless steel
	<b>Filling with Analysis Fluid:</b> Via analysis cabinet
	<b>Max. Load Capacity:</b> CTU10xx = 105 lbs (47.5 kg) CTU12xx = 105 lbs (47.5 kg)
	<b>Control:</b> PC-controlled with user-friendly software, rinse options and rinsing volume programmable

## Specifications

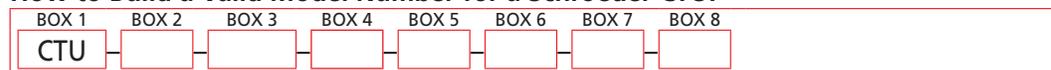
- CS 1000
- CS 1939
- CSI-C-11
- HY-TRAX®
- RBSA
- CSM
- TFL
- TFH
- FCU
- MCS
- AS
- SMU
- CTU**
- EPK
- Trouble
- Check Plus
- HMG2500
- HMG4000
- ET-100-6
- HTB
- RFSA
- HFS-BC
- HFS-15
- MFD-BC
- MFS, MFD
- HY-TRAX®
- Retrofit System
- MFD-MV
- MFS-HV
- AMS, AMD
- FS
- AMFS
- KLS, KLD
- MCO
- AKS, AKD
- LSN, LSA, LSW
- X Series
- OLF Compact
- OLF
- OLF-P
- NxTM
- VEU
- IXU
- Triton-A
- Triton-E
- NAV
- SVD01
- SVD
- OXS
- Appendix

## Specifications (cont.)

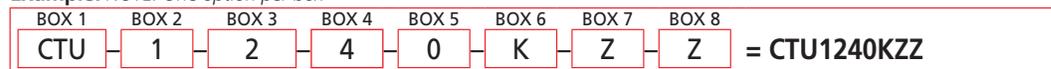
Reservoir and filtration module	Membrane Holder:	for ø1.85" (47 mm) to 1.97" (50 mm) filter membranes
	Vacuum Strainer:	For quicker filtration of the analysis fluid
	Diffuser:	Distribution of analysis fluid on the membrane
	Operating Pressure:	-12 to 87 psi (-0.8 to 6 bar)
	Analysis Fluid Reservoir:	2x 5.3 gal (20 l) (1x reservoir, 1x suction reservoir)
	Reservoir Change-over:	Automatic
	Filtration of Analysis Fluid:	Fine filtration according ISO 4406 min. ISO 12/9
	Filter Size, Filtration Rating:	2x LF BN/HC 60, 3 µm (1x0 series) 2x MRF-1-E/1, 1 µm (1x1 series)
	Integrated Drip Tray:	6.6 gal (25 litre) with drainage
	Ultrasound:	100 W, 40KHz
	Dimensions:	Dimensions: 7.9" (200 mm) x 4.3" (110 mm) x 1.6" (40 mm); Mesh width: 0.16" (4 mm)
	Emission Sound Pressure Level:	L <sub>pa</sub> <70 db(A)
Services to be provided by operator*	Compressed Air:	Air Filtered (min. 5µm) and dry compressed air, max. 1741 psi (6 bar) Air flow rate: 15.8 gpm (60 lpm), Supply connection: DN 7.2
	*Not supplied	Power Supply: According to order

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder CTU:



Example: NOTE: One option per box



BOX 1	BOX 2	BOX 3
<b>Series</b>	<b>Model</b>	<b>Installation Size</b>
CTU = Contamination Test Unit	1 = Analysis Cabinet (clean room)	0 = Dimensions analysis cabinet: 11.8"x30.2"x14.4" (300mm x 768mm x 365mm) (effective height x width x length) 2 = Dimensions analysis cabinet: 18.1"x30.2"x25.6" (460mm x 768mm x 650mm) (effective height x width x length)
BOX 4		BOX 5
<b>Analysis</b>		<b>Analysis Fluid</b>
3 = Version 2011 with ConTes software, 1µm filtration and automatic pressure control 4 = Version 2014 – Compression closure, cleanbox – Internal extraction, cleanbox – filled via 3/2 way ball valve and filling hose – Monitor arm (only 124x) – Nozzles with plug-in connection (plug-in nipple in analysis chamber)		0 = Solvent A III Class (Flashpoint > 140°F (60°C), lower explosion limit > 0.6 Vol.%) 1 = Water with surfactants, admissible pH-range 6 to 10, no deionized / demineralized water
BOX 6		BOX 8
<b>Supply Voltage</b>		<b>Supplementary Details</b>
K = 120 VAC / 60Hz / 1 Phase USA / CDN M = 230 VAC / 50Hz / 1 Phase Europe N = 240 VAC / 50Hz / 1 Phase UK		Z = Standard R = External rinsing connections 0.24" (Ø 6mm), between the hand holes F = Fluid connections A/B/C and R fitted with rapid quick-release fastener on outside, Control line to CTM-E modules A = Manual change-over for filter membrane holder
BOX 7		
<b>Extraction Process</b>		
Z = Spray (medium pressure) U = Spray (medium pressure)		

**Note:** Analyzing Fluid not supplied with unit - G60 Analyzing Fluid, 30L; PN 03205511

This information relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

# EasyTest Patch Kit

**EPK**

## Features and Benefits

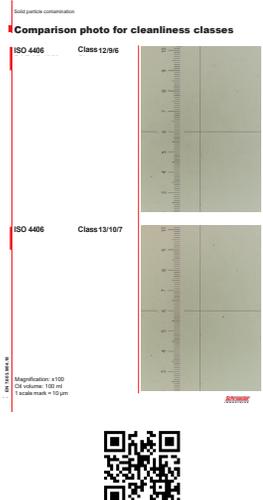
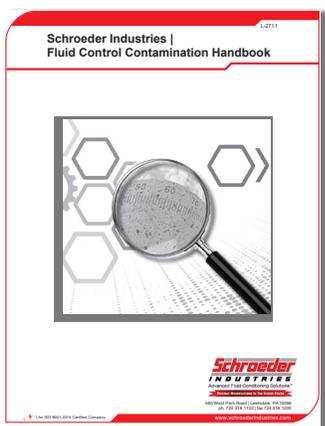
- User-friendly visual analysis of solid contamination
- Compatible with mineral-based hydraulic fluids and lubricants, and petroleum distillates
- Enables solid contaminant quantification and identification
- Provides on-site results in a matter of minutes

## Applications

- Perform quick on-site determination of contamination levels of solid particles
- Supplement on-site laboratories
- Use as a tool to demonstrate need for solid contamination mitigation



The Schroeder EasyTest Patch Kit (EPK) provides the necessary tools to determine the level of solid particulate contamination present in a fluid sample. Using the vacuum pump contained in the kit, the fluid sample is drawn through a membrane patch. The residual particulate left on the patch is viewed under a microscope and compared to photos of known contamination levels in the L-2711 Schroeder Contamination Handbook (included).



Kit as supplied includes:

Quantity	Description	P/N
1	Hand-held vacuum pump	7619502
3	Syringe, 30 mL	7626475
50	Disposable Petri Dishes	7630320
1	Forceps	7626481
1	Membrane patches, 0.45 µm, 25 mm, (100 pack)	2701997
1	Membrane patches, 0.8 µm, 25 mm, (100 pack)	2701952
1	Carrying Case	7640195
1	Microscope, 10x - 200x	7635242
1	Plastic funnel	7626479
1	Solvent dispenser bottle	7626473
1	Solvent dispenser bottle cap	7640496
3	Plastic sample bottle, 4 oz.	7626480
1	Solvent patch holder	7632471
1	Tubing, Tygon 3"	7624738
1	10' section of ¼" LDPE tubing	2701999
1	L-2711 Contamination Handbook & Instructions	7627179

## Description

## Model Selection + Items Supplied P/N 7640674

### NOTES:

Solvent is not supplied w/ the EPK. Recommended solvents include Heptane (99% by GLC), or Isopropyl Alcohol.

Kit contents are subject to change at the discretion of the manufacturer.

- CS 1000
- CS 1939
- CSI-C-11
- HY-TRAX®
- RBSA
- CSM
- TFL
- TFH
- FCU
- MCS
- AS
- SMU
- CTU
- EPK**

### Trouble Check Plus

- HMG2500
- HMG4000

### ET-100-6

### HTB

### RFSA

### HFS-BC

### HFS-15

### MFD-BC

### MFS, MFD

### HY-TRAX® Retrofit System

### MFD-MV

### MFS-HV

### AMS, AMD

### FS

### AMFS

### KLS, KLD

### MCO

### AKS, AKD

### LSN, LSA, LSW

### X Series

### OLF Compact

### OLF

### OLF-P

### NxTM

### VEU

### IXU

### Triton-A

### Triton-E

### NAV

### SVD01

### SVD

### OXS

### Appendix

**Features and Benefits**

- Easily performed determination of the absolute water content
- Direct comparison with the values measured in the lab thanks to the absolute water content being output in ppm
- High resolution in the lower measuring range
- Measurement series can be recorded for trend analysis
- Battery can be recharged via USB cable
- Illuminated display

**Applications**

- Perform quick on-site determination of contamination levels of water
- Supplement on-site laboratories
- Use as a tool to demonstrate need for water contamination mitigation



**Description**

The WaterTest Kit (WTK) is used for quantitative analysis of the absolute water content in mineral-oil-based lubricating and hydraulic fluids. The absolute water content is a measure of the actual water per volume of fluid. The measurement involves adding two reagents to the contaminated oil. This causes a pressure increase in the measurement cell that is output via the digital display as water content in vol. % or ppm.

Time per measurement: only approximately 5 minutes (without sample preparation).

**Specifications**

<b>General Data:</b>	<b>Measuring Range:</b>	0.02 to 1%* 0.1 to 5%* 100 to 1500 ppm* (0.01 to 0.15%) 200 to 6000 ppm* (0.02 to 0.6%) *) Measurement error < + 1.8 vol. % FS (full scale)
	<b>Measurement data memory:</b>	10 measurement series of 10 measurements each
	<b>Weight including carry case:</b>	2.7 kg
	<b>Dimensions of carry case:</b>	34 x 28 x 13.5 cm
<b>Hydraulic Data:</b>	<b>Permitted fluid:</b>	Mineral-oil-based lubricating and hydraulic fluid
	<b>Permitted fluid temperature:</b>	158°F (70°C)
<b>Electrical Data:</b>	<b>Power Supply Voltage:</b>	Internal battery rechargeable via USB cable

**Model Selection + Items Supplied  
P/N 7640674**



**NOTES:**

Replacement pack consisting of consumables sufficient for 50 tests can be ordered separately.

**Kit as supplied includes:**

Quantity	Description
1	Aluminum case
1	Measurement cell
1	Bottle containing reagent A (500 mL)
25	Sachet containing reagent B
1	Measuring beaker (100 mL)
1	Plastic tweezers
3	Agitator (in plastic case)
10	Syringe (1 mL)
3	Syringe (5 mL)
1	Test kit cleaner (250 mL)
1	Operating and maintenance manual
1	USB cable



# Trouble Check Plus Fluid Analysis

## Explanation of Results

### Total Acid Number (TAN) \*not applicable to Description: THF P/N: 7624310

Oxidation is the primary mechanism of oil degradation. The TAN measures the corrosive acidic by-products of oxidation. TAN results are reported in mg/g KOH (Potassium Hydroxide). Since all hydraulic fluids have some inherent acidic properties any increases in TAN must be compared to the new oil value as a baseline. Typically caution limits are set at +0.6 new oil value and critical limits are set at +1.0 new oil value. Certain application specific fluids may require limits set to manufacturer specifications. The results are graphed along with the limits to clearly show when oil oxidation has increased above acceptable levels. When the TAN has increased above the critical level, the oil should be changed immediately to prevent damage from occurring to your equipment.

### Spectrographic Analysis \*not applicable to Description: TWG P/N: 7624741

Additive, wear metal and contaminant levels are displayed in parts-per-million (ppm). The oil sample is analyzed for eighteen different elements. The results are also graphically displayed for easy detection of increasing or decreasing levels. The manufacturer blends additives into the oil in different forms and quantities. The additive package varies with the oil type. Wear metals indicate wear on particular components of an individual unit. These metals will indicate a wear problem on the microscopic level (< 8 microns) before the problem can be detected by conventional means. The existence of a wear problem is determined by absolute values of metals, and more importantly, by a relative increase or trend in one or more metals. Contaminants can be an indicator of internal or external contamination. The source and amount can be determined by a comparison with new oil data. Below is a list of additive types, wear metal and contaminant sources.

Additives	Function
Magnesium (Mg)	Dispersant / Detergent
Calcium (Ca)	Dispersant / Detergent
Barium (Ba)	Dispersant / Detergent
Zinc (Zn)	Anti-Wear
Molybdenum (Mo)	Anti-Wear
Phosphorous (P)	Anti-Wear
Wear Metals	Typical Source
Titanium (Ti)	Turbine Components, Bearings, Platings
Chromium (Cr)	Rings, Roller/Taper, Bearings, Rods, Platings
Iron (Fe)	Cylinders, Gears, Rings, Crankshafts, Liners, Bearings, Housings, Rust
Nickel (Ni)	Valves, Shafts, Gears, Rings, Turbine Components
Copper (Cu)	Bearings, Bushings, Bronze, Thrust-Washers, Friction Plates, Oil Cooler
Silver (Ag)	Bearings, Bushings, Platings
Aluminum (Al)	Pistons, Bearings, Pumps, Blowers, Rotors, Thrust-Washers, Dirt
Lead (Pb)	Bearing Overlays, Grease, Paint, Possible Additive in Gear Oils
Tin (Sn)	Bearings, Bushings, Piston Platings, Solder, Coolers
Vanadium	
Cadmium	
Contaminants	Typical Source
Sodium (Na)	Coolant, Sea Water, Dirt, Possible Additive
Boron (B)	Coolant, Sea Water, Possible Additive
Silicon (Si)	Dirt, Possible Additive (Anti-Foam)
Potassium (K)	

## Status and Recommendations

Corrective actions are recommended when applicable. The status of the sample is rated in three categories:

- Normal
  - System is operating within the parameters established by baseline data & prior samples.
  - System requires no immediate action.
- Abnormal
  - System is operating outside of caution limits in one or more areas.
  - System requires scheduled maintenance.
- Critical
  - System is operating outside of critical limits in one or more areas.
  - System requires immediate attention.

## Model Number Selection

Model Code	
Description: THF P/N: 7624310	Total Conditioning Analysis Kit
Description: TWG P/N: 7624741	Water Glycol Kit

### NOTES:

Sample kits sold in case lots of 10 pieces. No samples will be processed without completed paperwork supplied with kits.



## Features and Benefits

- Simple and user-friendly operation
- Large, full color graphics display
- Quick and independent basic setting by use of automatic sensor recognition
- HMG 2500 can only be used with Schroeder HSI and Schroeder SMART sensors
- Up to 4 sensors and 32 measurement channels can be connected simultaneously
- Sampling rates up to 0.1 ms
- Very large data memory for archiving measurement curves
- Various measurement modes: Normal measuring, Fast curve recording, Long-term measurement
- 2 independent triggers, can be linked logically
- Simple sensor connection with M12x1 push-pull connector
- PC connection: USB and RS 232
- Convenient visualization, archiving and data processing using the HMGWIN software supplied

Automated setting procedures, a simple, self-explanatory operator guide and many comprehensive functions ensure the operator is able to carry out a wide range of measurement tasks within a very short time. This makes the HMG 2500 an ideal companion for employees in maintenance, commissioning and service.

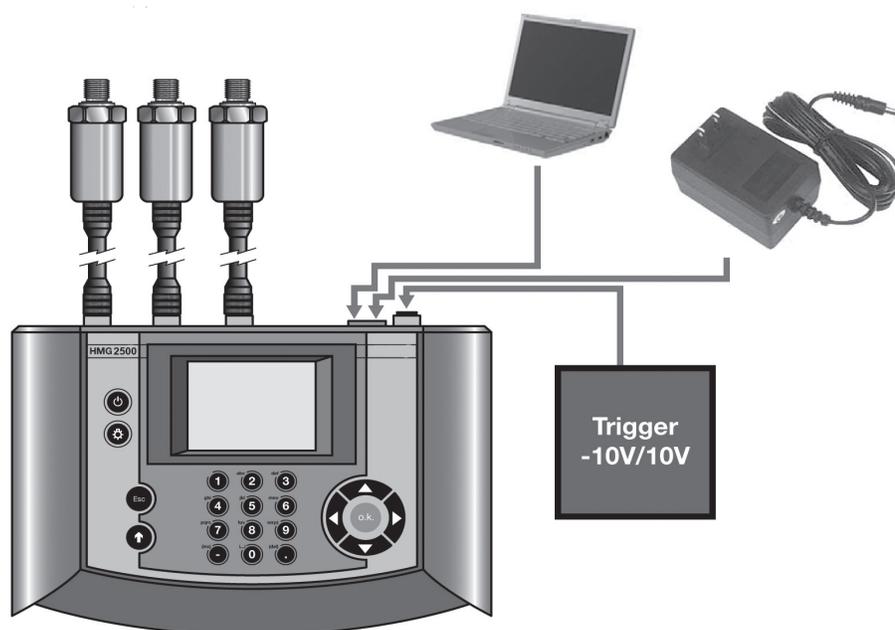
The device is designed primarily to record pressure, temperature and flow rate values, which are the standard variables in hydraulics and pneumatics. For this purpose, special sensors are available. The HMG 2500 recognizes the measured variable, measuring range and the unit of these sensors and automatically carries out the basic device settings accordingly.

In addition to this, the HMG 2500 has a digital input, e.g. for frequency or speed measurement, as well as a virtual measurement channel for the measurement of difference or performance.

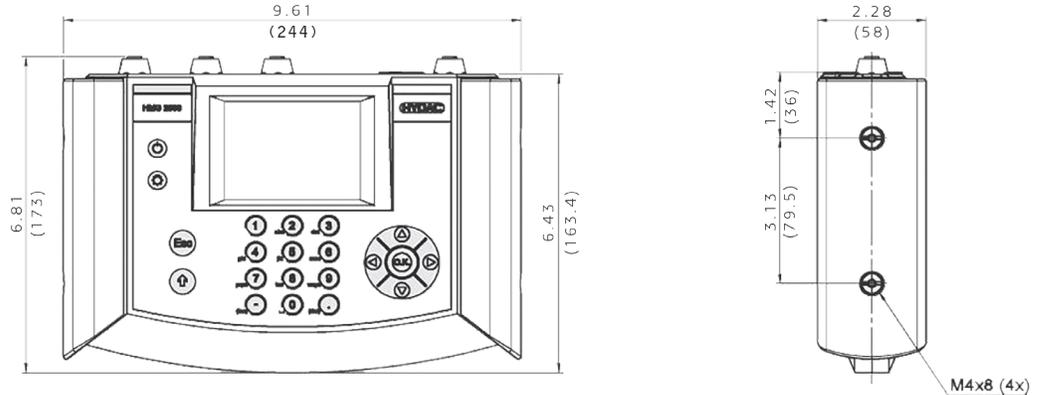
Due to the wide range of functions and its simple handling, the HMG 2500 is just as appropriate for users who take measurements only occasionally as it is for professionals for whom measuring and documentation are routine.

The HMG 2500 is designed to accept future upgrades of the device software.

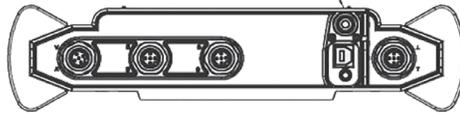
## Description



## Dimensions

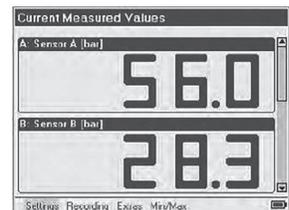
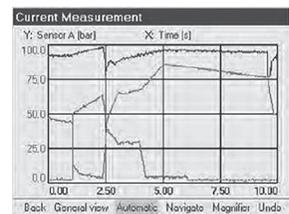


Shown with protective cover open



## Function

- Clear and graphical selection menus guide the operator intuitively to all the device functions available. A navigation pad on the keypad ensures rapid operation
- The HMG 2500 can monitor signals from up to 4 sensors simultaneously.
- The following sensors can be connected to 3 of these input sockets:
  - 3 analogue sensors (e.g. for pressure, temperature and flow rate) with the special digital HSI interface (Sensor Interface); this means the basic device settings (measured variable, measuring range and unit of measurement) are undertaken automatically
  - 3 analogue sensors (e.g. for pressure, temperature and flow rate) with the special digital HSI interface (Sensor Interface); *reference HSI information above*
- Frequency measurements, counter functions or triggers for data logging can be implemented via the fourth input socket with one digital input
- Additionally, the HMG 2500 has a virtual measurement channel which enables a differential measurement or a performance measurement by means of the sensors connected to the measurement channels "A" & "B"
- All input channels can operate simultaneously at a **sampling rate** of 0.5 ms (1.0 ms for SMART sensors). For the recording of highly dynamic processes, a sampling rate of 0.1 ms can be achieved
- The most impressive function of the HMG 2500 is without doubt its ability to record dynamic processes as a **measurement curve "online"**, i.e. in real-time, and to render them as graphs in the field
- The **data memory** for recording curves or logs can hold up to 500,000 measured values per recording. Over 100 of such data recordings in full length can be stored in an additional archiving memory
- For specific, **event-driven curves or logs**, the HMG 2500 has two independent triggers, which can be linked together logically
- User-specific device settings can be stored and re-loaded at any time as required. This means that repeat measurements can be carried out on a machine again and again using the same device settings
- Measured values, curves or texts are visualized on a **full color graphics display** in different selectable formats and display forms
- Numerous useful and easy-to-use **auxiliary functions** are available, e.g. zoom, ruler tool, differential value graph creation and individual scaling, which are particularly for use when analyzing the recorded measurement curves



Name	Save	SaveDt
power unit 10	28.08.08	12:44:58
injection machine 17	28.08.08	12:44:41
hydraulic press	28.08.08	12:43:04
power unit	28.08.08	12:42:03
injection machine 12	28.08.08	12:41:14

## Software

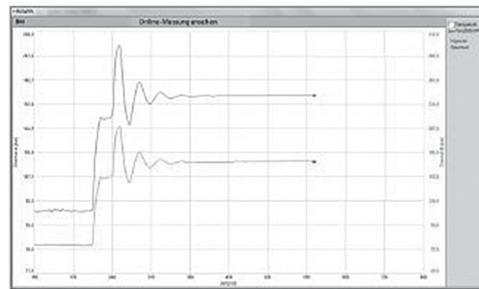
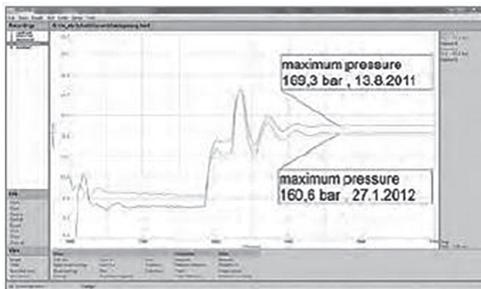
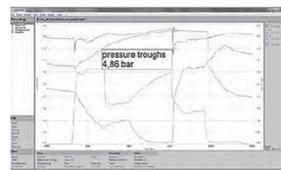
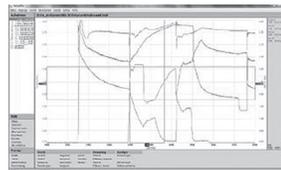
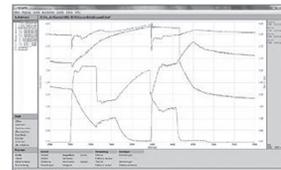
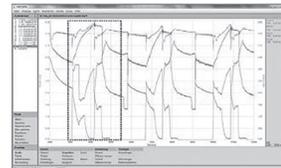
The HMG 2500 communicates with a computer via a USB or RS 232 port. Schroeder offers HMGWIN 2500, the matching software for the HMG 2500, for convenient post-processing, rendering, and evaluation of measurements on a pc. It also enables the HMG 2500 to be operated directly from a computer in real time.

The HMG 2500 is equipped with specially developed software providing for fast data collection and processing. A measurement curve can comprise up to 500,000 measured values. The HMG 2500's measured value memory is capable of storing at least 100 of these curves.

The Schroeder software, CMWIN, is also supplied that allows direct communication with SMART (HSI) sensors connected to the HMG 2500 from your PC.

### Some examples of the numerous useful additional functions:

- Transfer and archiving of measurements recorded using the HMG 2500
- Display of the measurements in graph form or as a table
- **Zoom function:** Using the mouse, a frame is drawn around an interesting section of a measurement curve, which is then enlarged and displayed
- **Accurate measurement** of the curves using the ruler tool (time values, amplitude values and differentials)
- Individual **comments** and measurement information can be added to the graph
- **Overlay** of curves, for example to document the wear of a machine (new condition/current condition)
- Using mathematical operations (calculation functions, filter functions), new curves can be added
- **Snap-shot function:** Comparable to the function of a digital camera, a picture can be taken immediately of any graph and saved as a .jpg file
- A professional measurement report can be produced at the click of a mouse: HMGWIN has an automatic layout function. Starting with a table of contents, all recorded data, descriptions and graphics and/or tables are combined into a professional report and saved as a .pdf file
- **Online function (HMGWIN only):** Starting, recording, and online display of measurements (similar to the function of an oscilloscope)
- Change of axis assignment of the recorded measurement parameters in graph mode (e.g. to produce a p-Q graph)



## Technical Data

<b>Analog Inputs</b>	
Input signals	HSI analogue sensors
3 channels M12x1 Ultra-Lock flange sockets (5-pin) channel A to channel C	HSI SMART sensors
Accuracy	≤ ± 0.1% FS
<b>Digital Input</b>	
1 channel via M12x1 Ultra-Lock flange socket Channel D	Digital status (high/low) Frequency (0.01 to 30,000 Hz)
<b>Calculated channel</b>	
Quantity	1 channel via virtual channel E
Sampling rate (dependent on number of active channels)	0.1 ms, max. 1 input channel 0.2 ms, max. 2 input channels 0.5 ms, all 3 input channels 1.0 ms, for SMART sensors
Resolution	12 bit
Memory	Min. 100 measurement curves, each with 500,000 measured values
Display	3.5" color display 7-segment display
Interfaces	1 USB, 1 serial interface RS 232
CE mark	EN 61000-6-1 / 2 / 3 / 4
Safety	EN 61010
IP class	IP 40
<b>Ambient conditions</b>	
Operating temperature	32°F to 122°F (0°C to 50°C)
Storage temperature	-4°F to 140°F (-20°C to 60°C)
Relative humidity	70%, non-condensing max
Weight	approx. 2.43 lb (1.1 kg)

## Order Details

**Model Code**  
Description: HMG 2500 - 000 - US  
P/N 925295

### Operating manual and documentation

US = English

### Scope of delivery

- HMG 2500
- Power supply for 90 to 230 V AC
- Operating Instructions
- Data carrier with USB drivers. HMGWIN software
- USB connector cable

### Accessories

- Additional accessories, such as electrical and mechanical connection adapters, power adapters, etc. can be found in the "Accessories for HMG Series" catalog pages.

## Features and Benefits

- Large, full graphics color display 5.7" touch screen
- Capable of recording up to 38 sensors at once, 8 analog, 2 digital sensors and 28 HSCI sensors via CAN bus
- Up to 100 measurement channels can be depicted simultaneously
- High-speed measuring rate, up to 8 sensors at 0.1 ms at a time
- Rapid and automatic basic setting of the device by means of automatic sensor detection
- Analog inputs 0.. 20 mA, 4 .. 20 mA Voltage 0 .. 50V, -10 .. 10 V
- PT 100/1000 input
- Connection to a CAN bus system (also J1939)
- Simple and user-friendly operation, intuitive menu
- Very large data memory for archiving measurement curves enables the storage of 500 measurements with up to 8 Million measured values
- Various measurement modes: Measuring, Fast curve recording, Long term measurements
- Recording of dynamic processes "online" in real time
- Event-driven measurements with several triggering options
- PC interface via USB
- USB Host connection for USB memory sticks
- Convenient visualization, archiving and data processing using the HMGWIN software



The HMG 4000 hand-held measuring unit is a portable measuring and data logging device. It was mainly developed for all values measured in relation with hydraulic systems, such as pressure, temperature, flow rate and position. Moreover, it provides a very high flexibility, even when it comes to evaluating other measuring values. The main applications are servicing, maintenance or test rigs.

The HMG 4000 has a very easy-to-operate user interface due to its large 5.7" touchscreen. The operator can access all of the unit's functions and settings by means of clearly presented selection menus.

The HMG 4000 can record the signals of up to 38 sensors at once. For this purpose, Schroeder Industries offer special sensors, which are automatically detected by the HMG 4000 and whose parameters such as measurement values, measuring ranges and measuring units can be set.

On the one hand, there are the HSI Sensors (Sensor Interface) for the measurement of pressure, temperature and flow rate, for the connection of which there are 8 analog input channels. Furthermore, there is the option of connecting Schroeder SMART sensors to these inputs. SMART sensors can display several different measured variables at a time.

Up to 28 special HCSI-Sensors (CAN Sensor Interface) can be connected additionally via the CAN bus Port, also supporting automatic sensor detection.

HMG 4000 can optionally be connected to an existing CAN network. This enables the recording of measured data transmitted via CAN bus (e.g. motor speed, motor pressure) in combination with the measured data from the hydraulic system.

The device also offers measurement inputs for standard sensors with current and voltage signals. The HMG 4000 rounds off the application, providing two additional digital inputs (e.g. for frequency or rpm measurements).

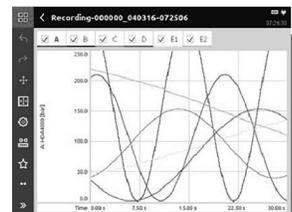
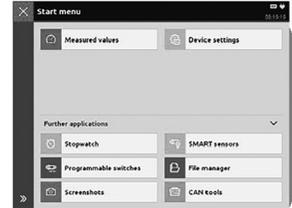
The most impressive feature of the HMG 4000 is its ability to record the dynamic processes of a machine in the form of a measurement curve and render them as a graph — and, moreover, online and in real-time.

Schroeder software HMGWIN which is specific to the HMG 4000, is supplied for convenient postprocessing, rendering and evaluation of measurements on your computer.

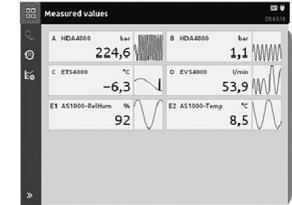
## Description

## Function

- Clear and graphical selection menus intuitively guide the operator to all the device functions available and ensure fast implementation.
- HMG 4000 can detect the signals of up to **38 sensors simultaneously**. 11 Push-pull M12x1 input sockets are available as sensor interfaces. Apart from the push-pull sensor connection cable, M12x1 standard cables can also be used.
- The following sensors can be connected to 8 of these input sockets:
  - 8 analogue sensors (e.g. for pressure, temperature and flow rate) with the special digital HSI interface (Sensor Interface); this means the basic device settings (measured variable, measuring range and unit of measurement) are performed automatically.
  - 8 standard analog sensors with current and voltage signals
  - 8 condition monitoring sensors (SMART sensors), the basic device settings are also performed automatically.
- The blue input socket provides 2 digital inputs, i.e. for 1 or 2 speed sensors (2nd speed sensor connection via Y adapter). Frequency measurements, counting functions or triggers can as well be implemented for data recording.
- Different **CAN bus** functions can be utilized via the red input socket.
  - Connection of up to 28 HCSI sensors (CAN Sensor Interface) by setting up a CAN bus with HCSI sensors and the relevant connection accessories, also with automatic parameterization.
  - Connecting to a CAN bus, you have the option of evaluating up to 28 CAN messages
  - Configuration of **CAN Sensors**, the parameterization is performed by means of EDS files, which can be stored and administrated in the HMG 4000
- The yellow input socket serves as the interface for pressure, temperature or level switches with **I/O Link** as well as for the programming device HPG P1. These devices can be parameterized by means of the HMG 4000.
- The most impressive function of the HMG 4000 is its ability to record dynamic processes “online”, i.e. in real-time, as a **measurement curve** and to render them as graphs. During the recording process of a measuring curve, you can zoom in the curve sections of interest using gestures on the touchscreen.
- For the purpose of recording highly dynamic processes, all 8 analog input channels can be operated simultaneously at a **measuring rate** of 0.1 ms.
- The **data memory** for the recording of curves or logs can memorize up to 8 million measured values. At least 500 of such data recordings in full length can be stored in an additional archiving memory.
- For the targeted **event-driven curve or log recording**, the HMG 4000 has two independent triggers which can be linked together logically. In addition, there is a “start/stop” condition, by means of which a measurement can be initiated or finished.
- User-specific instrument settings can be stored and re-loaded at any time as required. This means that repeat measurements can be carried out on a machine again and again using the same device settings.
- Measured values, curves or texts are visualized on a **full-graphics color display** in different selectable formats and display forms.
- Numerous useful and easy-to-use auxiliary functions are available, e.g. zoom, ruler tool, differential value graph creation and individual scaling, which are particularly for use when analyzing the recorded measurement curves.
- The communication between the HMG 4000 and a PC is performed via the built-in USB port.
- A HMG 4000 connected to your PC is recognized and depicted as a directory by the PC. You can conveniently move measured data to your PC. Optionally, data transfers can be carried out via a file manager by means of a USB memory stick.



Folder	Name	Size
Folder	0	22.02.15 09:27:48 (204 Bytes)
Measurement	00000_050415-140209	04.05.15 14:52:00 (21.9 MB)
Measurement	00000_160715-113732	16.07.15 12:29:06 (2.29 MB)
Measurement	00000_170715-074532	17.07.15 07:50:07 (1.42 MB)
Measurement	00000_170715-141328	17.07.15 14:20:09 (0.39 MB)
Switch	1	18.05.15 11:52:00 (540 Bytes)
Switch	7	05.09.15 08:24:44



## Software

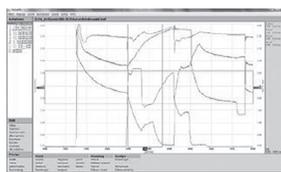
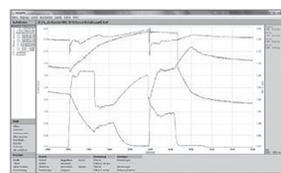
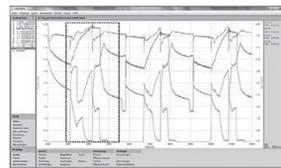
The PC software HMGWIN is also supplied with the device. This software is a convenient and simple package for analyzing and archiving curves and logs which have been recorded using the HMG 4000, or for exporting the data for integration into other PC programs if required. In addition it is also possible to operate the HMG 4000 directly from the computer. Basic settings can be made, and measurements can be started online and displayed directly on the PC screen in real-time as measurement curves progress.

HMGWIN can be run on PCs with Windows 7, Windows 8.1 as well as Windows 10 operating systems.

\*) SMART sensors (Condition Monitoring Sensors) are a generation of sensors which can provide a variety of different measurement variables.

### Some examples of the numerous useful additional functions:

- Display of the measurements in graph form or as a table
- **Zoom function:** Using the mouse, a frame is drawn around an interesting section of a measurement curve, which is then enlarged and displayed
- **Accurate measurement** of the curves using the ruler tool (time values, amplitude values and differentials)
- Individual **comments** and measurement information can be added to the graph
- **Overlay** of curves, for example to document the wear of a machine (new condition/current condition)
- Using mathematical operations (calculation functions, filter functions), new curves can be added
- **Snap-shot function:** Comparable to the function of a digital camera, a picture can be taken immediately of any graph and saved as a .jpg file
- A professional measurement report can be produced at the click of a mouse: HMGWIN has an automatic layout function. Starting with a table of contents, all recorded data, descriptions and graphics and/or tables are combined into a professional report and saved as a .pdf file
- **Online function (HMGWIN only):** Starting, recording, and online display of measurements (similar to the function of an oscilloscope)
- Change of axis assignment of the recorded measurement parameters in graph mode (e.g. to produce a p-Q graph)



### Analog Inputs

Input signals	HSI analogue sensors
8 channels M12x1 Ultra-Lock flange sockets (5 pole) channel A to channel H	HSI SMART sensors Voltage signals: i.e. 0.5 .. 4.5 V, 0 .. 10 V etc. (input ranges for 0 .. 50 V, 0 .. 10 V, 0 .. 4.5 V, -10 .. 10 V) Current signals, i.e. 4 .. 20mA, 0 .. 20mA (input range 0 .. 20 mA) 1 x PT 100 / PT 1000 (on Channel H)
Accuracy dependence of the input range	≤ ± 0.1% FS at HSI, voltage, current ≤ ± 1 % FS at PT 100 / PT 1000

### Digital Inputs

Input signals	Digital status (high/low)
2 channels via M12x1 Ultra-Lock flange socket (5 pole) Channel I, J	Frequency (0.01 to 30,000 Hz) PWM duty cycle Durations (i.e. Period length)
Level	Switching threshold / switch-back threshold: 2 V/1 V Max input voltage: 50 V
Accuracy	≤ ± 0.1 %

### CAN

Input signals	HCSI sensors, CAN, J1939, CANopen PDO, CANopen SDO
28 channels M12x1 Ultra-Lock flange socket (5 pole) channel K1 to K28	
Baud rate	10 kbit/s to 1 Mbit/s
Accuracy	≤ ± 0.1 %

### Calculated channels

Quantity	4 channels via virtual port L (channel L1 to channel L4)
----------	--

## Technical Data

## Technical Data

<b>Programming interface</b>	
For O-Link devices	1 channel via M12x1 Ultra-Lock flange socket (5 pole)
<b>Voltage supply</b>	
Network operation	9 to 36 V DC via standard round plug 2.1 mm
Battery	Lithium-Nickel-Kobalt-Aluminum-Oxide 3.6 V; 9300 mAh
Battery charging time	approx. 5 hours
Service Life	without sensors: approx. 11 hours with 2 sensors: approx. 9 hours with 4 sensors: approx. 7 hours with 8 sensors: approx. 4 hours
<b>Display</b>	
Type	TFT-LCD Touchscreen
Quantity	5.7"
Resolution	VGA 640 x 480 Pixel
Backlight	10 to 100% adjustable
<b>Interfaces</b>	
<b>USB Host</b>	
Plug-in connection	USB socket, Type A, screened
USB Standard	2.0 (USB Full speed)
Transmission rate	12 Mbit/s
Voltage supply	5 V DC
Power supply	100 mA max.
Protection	short circuit protection to GND (0 V)
<b>USB Slave</b>	
Plug-in connection	USB socket, Type B, screened
USB Standard	2.0 (USB High speed)
Transmission rate	480 Mbit/s
Voltage supply	5 V DC
Power supply	100 mA max.
Protection	short circuit protection to GND (0 V)
<b>Memory</b>	
Measured value memory	16 GB for min. 500 measurements, each containing 8 Million measured values
<b>Technical Standards</b>	
EMC	IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8
Safety	EN 61010
IP class	IP 40
<b>Ambient conditions</b>	
Operating temperature	32°F to 122°F (0°C to 50°C)
Storage temperature	-4°F to 140°F (-20°C to 60°C)
Relative humidity	70%, non-condensing max
Dimensions	approx. 11.22 x 7.44 x 3.43 in (B x H x T)
Weight	approx. 4.08 lb (1.85 kg)
Housing material	Plastic (Elastollan® R 3000 - TPU-GF)

## Order Details

Additional accessories, such as electrical and mechanical connection adapters, power adapters, etc. can be found in the "Accessories for HMG Series" catalog pages.

### Model Code

Description: HMG 4000 - 000 - US  
P/N 925283

### Scope of delivery

- HMG 4000
- Power supply for 90 to 230 V AC
- Strap

### Operating manual and documentation

US = English

- Operating Instructions
- Data storage medium containing USB drivers HMGWIN and CMWIN software
- USB connector cable

- Pressure, temperature and flow rate transmitters with HSI sensor detection as well as CAN pressure transmitters with HCSI sensor detection, see below and next page:

### Pressure Transducer with HSI (Sensor Interface)

Model Code	Description	Part No.
HDA 4748-H-0016-000	-14.5 to 130.5 psi (-1 to 9 bar)	909429
HDA 4748-H-0016	0 to 230 psi (0 to 16 bar)	909425
HDA 4748-H-0060-000	0 to 870 psi (0 to 60 bar)	909554
HDA 4748-H-0100-000	0 to 1450 psi (0 to 100 bar)	909426
HDA 4748-H-0250-000	0 to 3625 psi (0 to 250 bar)	909337
HDA 4748-H-0400-000	0 to 5800 psi (0 to 400 bar)	909427
HDA 4748-H-0600-000	0 to 8700 psi (0 to 600 bar)	909428
HDA 4778-H-0135-000	-14.5 to 135.5 psi (-1 to 9.34 bar)	920755
HDA 4778-H-0150-000	0 to 150 psi (0 to 10 bar)	920663
HDA 4778-H-1500-000	0 to 1500 psi (0 to 103 bar)	920757
HDA 4778-H-3000-000	0 to 3000 psi (0 to 207 bar)	920756
HDA 4778-H-6000-000	0 to 6000 psi (0 to 144 bar)	920664
HDA 4778-H-9000-000	0 to 9000 psi (0 to 621 bar)	920665

### HCSI Pressure Measuring Transducer (HMG 4000 only CANbus)

Model Code	Description	Part No.
HDA 4748-HC-0009-000 (-1...+9 bar)	-1 ... 9 bar	925287
HDA 4748-HC-0016-000	0 ... 16 bar	925298
HDA 4748-HC-0060-000	0 ... 60 bar	925305
HDA 4748-HC-0100-000	0 ... 100 bar	925299
HDA 4748-HC-0160-000	0 ... 160 bar	925286
HDA 4748-HC-0250-000	0 ... 250 bar	925304
HDA 4748-HC-0400-000	0 ... 400 bar	925303
HDA 4748-HC-0600-000	0 ... 600 bar	925301
HDA 4748-HC-1000-000	0...1000 bar	925300

### HCSI Temperature Measuring Transducer (HMG 4000 only CANbus)

Model Code	Description	Part No.
ETS 4148-HC-006-000	-13 to +212 °F	925302

### Speed Sensors

Model Code	Description	Part No.
HDS 1000-002	Rpm Sensor (plug M12x1) 2M; Includes HDA 1000 Reflector Set (part no. 904812)	909436
HDS 1000 Reflector Set	Reflective foil set 25 pieces	904812
SSH 1000 (HMG 2500 only)	Sensor simulator for 2 HSI (ideal for training purposes)	909414
HSS 210-3-050-000 (HMG 4000 only)	Rpm Sensor (in connection with ZBE 46)	923193
HSS 220-3-046-000 (HMG 4000 only)	Rpm Sensor (in connection with ZBE 46)	923195

### Temperature Transducer with HSI (Sensor Interface)

Model Code	Description	Part No.
ETS-4148-H-006-000	-13° to 212°F (-25° to 100°C)	923398

## Available Accessories

### NOTES:

The information in this catalog relates to the operating conditions and applications described. For applications or operating conditions not described, please contact us a [filtersystemsmanger@schroederindustries.com](mailto:filtersystemsmanger@schroederindustries.com).

Subject to technical modifications

### Sensor Cables (HMG 4000 only)

Model Code	Description	Part No.
Push-pull connection on plug-side		
ZBE 40-02	(CABLE M12X1/5P, PUSH-PULL) 2M length	6177158
ZBE 40-05	(CABLE M12X1/5P, PUSH-PULL) 5M length	6177159
ZBE 40-10	(CABLE M12X1/5P, PUSH-PULL) 10M length	6177160
Screw connection		
ZBE 30-02	(Sensor cable M12x1, 5-pin) 2M length	6040851
ZBE 30-05	(Sensor cable M12x1, 5-pin) 5M length	6040852

### Flow Sensor with HSI (Sensor Interface)

Model Code	Description	Part No.
Aluminum		
EVS 3108-H-0020-000	0.26 to 5.28 gpm (1.2 to 20 L/min)	909405
EVS 3108-H-0060-000	1.59 to 15.9 gpm (6 to 60 L/min)	909293
EVS 3108-H-0300-000	3.96 to 79.3 gpm (15 to 300 L/min)	909404
EVS 3108-H-0600-000	10.6 to 159 gpm (40 to 600 L/min)	909403
Stainless Steel		
EVS 3118-H-0020-000	0.26 to 5.28 gpm (1.2 to 20 L/min)	909409
EVS 3118-H-0060-000	1.59 to 15.9 gpm (6 to 60 L/min)	909406
EVS 3118-H-0300-000	3.96 to 79.3 gpm (15 to 300 L/min)	909408
EVS 3118-H-0600-000	10.6 to 159 gpm (40 to 600 L/min)	909407

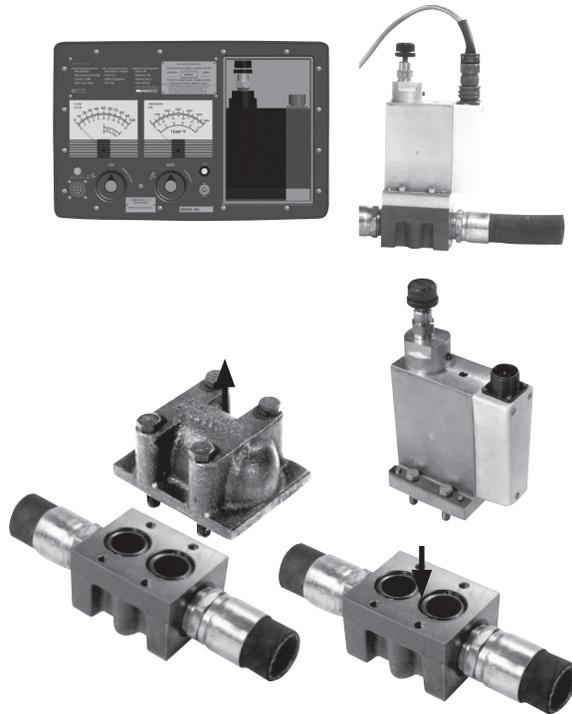
### Other Accessories

Model Code	Description	Part No.
Pelican Case	for HMG 2500 and accessories	2702730
Case for HMG 4000	Case for HMG 4000 and accessories	6179836
USB Cable (HMG 2500 only)	Connection to PC	6040585
ZBE 30-02 (HMG 2500 only)	cablE for M12x1 - 6'	6040851
ZBE 30-05 (HMG 2500 only)	cablE for M12x1 - 15'	6040851
ZBE 36 (HMG 2500 only)	TWS (TestMate® Water Sensor) Adapter	909737
Power Supply	DC Charging unit for HMG 2500	6054296
ZBE 31	Car charger for HMG Unit	909739
HCSI Y splitter	Y splitter for HCSI sensors	6178196
HCSI bus termination	Termination connector for HCSI Sensors	6178198
ZBE 46	Pin adapter HMG (for three-wire signals, AS, ...)	925725
ZBE 100	Adapter for TFP 100	925726
ZBE 38	Y adapter, black for jack I/J	3224436
ZBE 26	Y adapter, blue for HLB 1000	3304374
ZBE 41	Y adapter, yellow for TCM sensor	910000
UVM 3000	Universal connection module for HMG 4000 only	909752
Hydraulic Adapter set	Adapter hose DN 2 / 1620/1620, 400 mm and 1000 mm, pressure gauge connection 1620/ G1/4, adapter 1615/ 1620, bulkhead couplings 1620/ 1620	903083

## Description

### Features and Benefits

- Easy to use—for beginner or experienced troubleshooters
- Large meters are clearly marked with easy-to-read scales
- Scale selector switches and the load valve control knob are also large and specially designed to be easy to grip under any conditions
- All loose components are stowed in form-fitting recesses in the impact resistant plastic case that also protects the meters and circuitry
- The electronic sensor and the EasyTest fitting are the only components that see hydraulic fluid, so clean-up is limited to draining the sensor and replacing the cap on the EasyTest fitting
- The load valve allows the operator to simulate operating pressure, if required



Schroeder's original TestMate® system with the patented EasyTest fitting provides the hydraulic user with a quick, convenient method to test, troubleshoot, and obtain preventive maintenance data on hydraulic systems. Flows up to 100 gpm and pressures up to 6000 psi, as well as operating temperature, are measured through an EasyTest fitting, which is permanently installed in the hydraulic system.

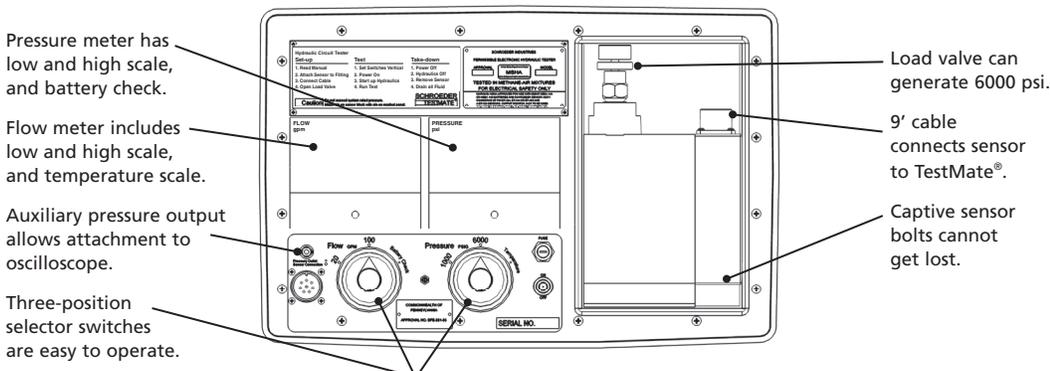
The sensor and EasyTest fittings are robust units designed to operate safely at any system pressure up to the maximum 6000 psi that the sensor load valve is capable of generating. Pressure bearing parts are thick section aluminum extrusions carefully chosen for their combination of high strength and light weight.

If the system's prime mover is kept at constant rpm, any drop in indicated flow will represent a loss of system efficiency at the point of test. During testing, system operation can be used to create the load, or the load can be simulated with the load valve in the sensor block.

The electronic circuitry produces data that accurately reflects system performance at each test point throughout the operating pressure range, making it possible to also determine pump and motor efficiency as well as valve and cylinder leakage.

- Check systems before and after rebuild
- Use as part of a preventive maintenance program
- Use to troubleshoot in instances of poor system performance or excessive machine downtime
- Use to check performance on a production line
- Install EasyTest fittings on prototypes to accurately evaluate hydraulic performance at any stage of development

## Applications



### NOTES:

Box 2. Required for any underground coal mining application. Unit will be furnished with the required MSHA tag.

<b>Flow Meter</b>	Type:	Electronic turbine
	Low Scale Range:	0 to 20 gpm (0 to 75.7 L/min)
	Low Scale Accuracy:	±1 gpm @ 3 to 5 gpm (11-19 L/min) ±0.2 gpm @ 6 to 20 gpm (22.7-75.7 L/min)
	High Scale Range:	0 to 100 gpm (0 to 378 L/min)
	High Scale Accuracy:	±2% of full scale
<b>Pressure Meter</b>	Type:	Electronic transducer
	Low Scale Range:	0 to 1000 psi (0 to 69 bar)
	Low Scale Accuracy:	±35 psi (2.41 bar)
	High Scale Range:	0 to 6000 psi (0 to 413.8 bar)
	High Scale Accuracy:	±120 psi (8.44 bar)
Auxiliary Pressure Output:		BNC connector - 2.5 mv @ 0.1mA per 1000 psi (68.96 bar), linear in the range 0 to 6000 psi (0 to 413.8 bar), independent of meter scale selection
Temperature Scale:		50°F to 250°F (10°C to 121°C)
Power Source:		8 "C" size batteries <i>To be furnished by customer</i>
Weight:		18 lbs (8 kg)
Case Dimensions:		19.87 x 13.93 x 4.68 in (50.4 x 35.4 x 11.9 cm)
EasyTest Fitting Envelope Dimensions:		4.5 x 4 x 3 in (114 x 102 x 76 mm)
EasyTest Fitting Mounting Holes:		Qty 2 - .375 to 16 UNC .75 dp.
Clearance to Install Sensor:		11 in (280 mm) min

## EasyTest Fittings

Port Type and Size	Model Numbers		Port Type and Size	Model Numbers	
	Station with Through Flow for In-Line Testing	Station with Blocked Flow for "T" Testing		Station with Through Flow for In-Line Testing	Station with Blocked Flow for "T" Testing
<b>NPTF</b>			<b>SAE 4-Bolt Boss<sup>2</sup></b>		
0.75	A-ET-211	A-ET-197	0.75	A-ET-219	A-ET-205
1.00	A-ET-212	A-ET-198	1.00	A-ET-220	A-ET-206
1.25	A-ET-213	A-ET-199			
1.501	A-ET-256	A-ET-312			
<b>SAE O-Ring</b>			<b>BSP PL</b>		
1.06-12	A-ET-215	A-ET-201	0.75	A-ET-222	A-ET-314
1.3125-12	A-ET-216	A-ET-202	1.00	A-ET-223	A-ET-315
1.625-12	A-ET-217	A-ET-203	1.25	A-ET-224	A-ET-316
1.875-12 <sup>1</sup>	A-ET-258	A-ET-313			

<sup>1</sup>For 3000 psi only

<sup>2</sup>Depth of holes not per SAE specifications

## Model Number Selection

### How to Build a Valid Model Number for a Schroeder Original TestMate®:

BOX 1	BOX 2
ET-100-6	[ ]

**Example:** NOTE: One option per box

BOX 1	BOX 2	
ET-100-6	[ ]	= ET-100-6

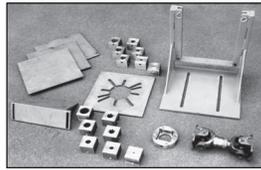
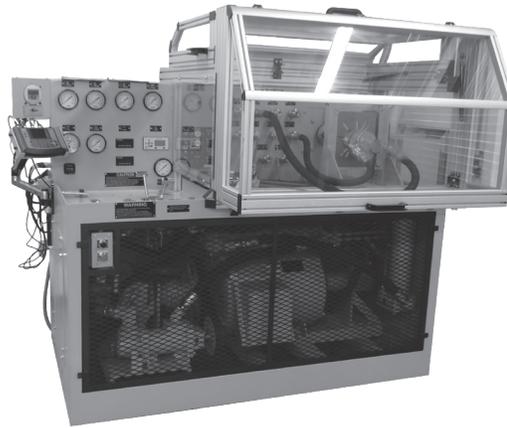
BOX 1 Model	BOX 2 Option
ET-100-6 Original TestMate®	Omit = None C = MSHA approved

# Hydraulic Test Bench

# HTB

## Features and Benefits

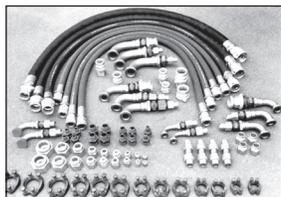
- An ingenious universal mounting bracket makes mounting pumps and motors on the bench a simple, quick operation
- Mounting plates are furnished to accommodate flange-mounted and foot-mounted pumps or motors
- Drive adapter equipment includes inserts for keyed shafts, an insert chuck and a universal drive shaft
- Quick disconnect porting on the bench provides convenient hook-up for test components
- Two complete operating manuals are supplied with each bench
- Kits and spare parts available for upgrades and maintenance



The Schroeder Model HTB hydraulic test bench is the ultimate diagnostic tool, capable of thoroughly testing a vast array of new or rebuilt components and subassemblies prior to their installation in a working system. Test bench instrumentation has been designed to make diagnosis fast and accurate, with virtually no requirement for connecting external instruments. The bench panel includes a digital flow gauge, a tachometer to measure the speed of tested pumps or motors, and a reservoir temperature gauge. Individual gauges measure pressure on the test bench main pump, the pump or motor being tested, the test bench load pump, the cylinder and valve pressure port, and the test bench super charge pump.

Every HTB includes efficient Schroeder hydraulic filters to keep the bench oil at optimum cleanliness, providing assurance that newly rebuilt components will not be subjected to harmful levels of dirt. To keep filters operating at peak efficiency, the instrument panel includes a red pilot light that signals the operator when any bench filter needs a new element.

These benches have been refined for over 50 years by Schroeder engineers, based on the comments and requests of over 1,000 test bench owners. The versatile hydraulic circuitry present in each of the three models can shorten troubleshooting time and take the guesswork out of diagnoses. Current models are powerful, compact units that pay for themselves quickly in saved maintenance time and expenses.



- Suction and pressure hose and fittings group (contains hose connection with female quick disconnects on both ends, plus a series of separate national pipe thread, straight thread, and SAE four-bolt flange adapters, ranging in size from 3/8" through 2", equipped with male quick disconnects)
- Filtration Group
- Safety Enclosure Group
- High Pressure Intensifier Circuit
- Bidirectional Pump Test Circuit
- HMG Digital Electronic Group
- Air Cooled Heat Exchanger
- 25 gpm Case Drain Meter
- TCM Kit
- Oil cooler
- Solenoid and pilot-operated valve test group
- Spline shaft adapter kit
- Jib Crane Group
- Digital Instrumentation Package
- Water Cooled Heat Exchanger

## Description

CS 1000

CS 1939

CSI-C-11

HY-TRAX®

RBSA

CSM

TFL

TFH

FCU

MCS

AS

SMU

CTU

EPK

Trouble  
Check Plus

HMG2500

HMG4000

ET-100-6

HTB

RFSA

HFS-BC

HFS-15

MFD-BC

MFS, MFD

HY-TRAX®  
Retrofit System

MFD-MV

MFS-HV

AMS, AMD

FS

AMFS

KLS, KLD

MCO

AKS, AKD

## Accessories

LSN, LSA, LSW

X Series

OLF Compact

OLF

OLF-P

NxTM

VEU

IXU

Triton-A

Triton-E

NAV

SVD01

SVD

OXS

Appendix

## Applications



**Pumps and motors** can be tested dynamically. Pump and motor testing is aided by the wide speed and torque ranges built into the bench and by the universal mounting bracket and mounting accessories that come with the bench. An open loop hydrostatic variable volume hydraulic system provides the power and speed control for the drive shaft. Motors can be dynamically tested, under load, for operating efficiency. Pumps can be tested for external leakage and volumetric efficiency in either direction, at speeds from 200 to 2400 rpm. The test bench can also be used to break-in pumps and motors to manufacturer's specifications before they are installed in a system.

**Cylinder** leaks are easy to find. Double-acting cylinders may be cycled, and tested for both internal and external leakage at any point of piston travel. Scored cylinder walls and defective packing are easily detected. Single-acting cylinders are tested at maximum stroke.

**Valve** testing time is minimized. Pressures can be set, external and internal leakage spotted, flow and pressure data can be generated and checked against operating requirements and overall valve efficiency determined. Optional electrical and pilot pressure supplies are available on the bench for testing solenoid-actuated and pilot-operated valves.

## Specifications

	Model HTB-50	Model HTB-100	Model HTB-150
Speed Range in either direction	200 to 2400 rpm	200 to 2400 rpm	200 to 2400 rpm
Power Available	275 ft-lbs to 1200 rpm	458 ft-lbs to 1200 rpm	670 ft-lbs to 1200 rpm
For testing pumps		(decreasing proportionately to 2400 rpm)	
Expressed torque		115 hp at 1200 rpm	150 hp at 1200 rpm
Expressed in horsepower	60 hp at 1200 rpm	(with constant hp to 2400 rpm)	
Test Pressure	0 to 5000 psi (345 bar)	0 to 5000 psi (345 bar)	0 to 5000 psi (345 bar)
Test Motor Load	275 ft-lbs	458 ft-lbs	670 ft-lbs
Maximum in either direction			
Electrical Drive			
Motor-230/460V, 1800 rpm;			
3 phase, 60 hertz.	50 hp	100 hp	100 hp and 50 hp
A start-stop push button is mounted on the bench. Starter(s) is/are not included. Customer must advise type of starter(s) and service voltage to be used.			
Hydraulics			
Main Bench Pump (variable piston)	23 gpm/5000 psi (87 L/min/345 bar)	38 gpm/5000 psi (144 L/min/345 bar)	38 gpm/5000 psi (144 L/min/345 bar)
Auxiliary Main Pump (variable piston)	N/A	N/A	23 gpm/5000 psi (87 L/min/345 bar)
Supplemental Pump	20 gpm/2000 psi (76 L/min/138 bar)	20 gpm/2000 psi (76 L/min/138 bar)	20 gpm/2000 psi (76 L/min/138 bar)
Pressure and Return Ports	1" quick disconnects	1" quick disconnects	1" quick disconnects
Suction Porting	1" & 2" quick disconnects	1" & 2" quick disconnects	1" & 2" quick disconnects
Flow Gauge Scales	Digital Readout from 0 to 100 gpm (all models)		
Reservoir Capacity	100 gallons (378 L)	100 gallons (378 L)	200 gallons (757 L)
General	Full flow 3 micron filtration maintains excellent system cleanliness level; bench includes a 30" x 30" work pan, oil level gauge, fill cap mesh strainer, digital tachometer.		
Bench Dimensions and Weight	62" H x 76" L x 43" W 4100 lbs (1860 kg)	62" H x 76" L x 43" W 4500 lbs (2041 kg)	62" H x 76" L x 55" W 6000 lbs (2722 kg) Auxiliary Power Unit 30" H x 50" L x 30" W 900 lbs (408 kg)

## How to Build a Valid Model Number for a Schroeder HTB:



**Example:** NOTE: One option per box



BOX 1	BOX 2	BOX 3	BOX 4	BOX 5
Model	HP	Voltage	Options	Custom Groups
HTB	50	A = 230V 60Hz	A = Water Cooled Heat Exchanger	Add G # for all custom parts & frame modifications.
	100	B = 460V 60Hz	B = Solenoid & Pilot Operated Valve Group	
	150	C = 575V 60Hz	C = Jib Crane Group	
		D = 380V 50H	D = Filtration Group (standard/included on all benches)	
		E = 415V 50Hz	E = Safety Enclosure Group	
		F = 380V 60Hz	G = Bidirectional Pump Test Circuit	
		G = 208V 60Hz	H = HMG Digital Electronic Group	
		H = 220V 50Hz	I = Air Cooled Heat Exchanger	
			J = 25 gpm Case Drain Meter	
			K = Digital Gauges	
			L = TCM Kit	
			Splined Shaft Group*	
			Hose & Fitting Group*	
			* Not part of BOM structure, listed as separate line item on P.O.	

NOTES:

Box 4. May have multiple options.

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